MODERN MENTAL NURSING

VOL. II

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MODERN MENTAL NURSING

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VOLUME II

THE CAXTON PUBLISHING COMPANY, LIMITED
CLUN HOUSE, SURREY STREET, LONDON, W.C.2

1921

Made and Printed in Great Britain by
Hazell, Watson & Viney, Ltd., London and Aylesbury.
ML.S. I

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VOLUME II

MODERN MENTAL NURSING

VOLUME II

SECTION III

GENERAL PRINCIPLES OF NURSING

CHAPTER 1

THE MANAGEMENT OF THE SICK-ROOM

GENERAL PRINCIPLES OF NURSING. GENERAL DUTIES. REQUIREMENTS OF THE SICK-ROOM. ARRANGEMENTS FOR GENERAL ROUTINE. OUT-DOOR METHODS OF TREATMENT. VERANDAH TREATMENT. NURSING IN TENTS. NURSING IN SHELTERS.

WHILE every endeavour has been made to follow the Syllabus of Subjects for Examination for the Certificate of Mental Nursing of the General Nursing Council for England and Wales, some slight alterations have been necessary. In the first place, the subject of First-aid is dealt with after the present Section. The fact that First-aid is a subject for examination in Part I need not cause any disturbance in the mental nurse's mind, since Section IV is self-contained and complete and can easily be studied out of its sequence.

Secondly, we have considered it more satisfactory to amalgamate Parts 1 and 2 of the Theory and Practice of Nursing. This may have involved here and there a certain amount of rearrangement, and occasionally a minor omission, but on the whole it will possibly be agreed by the mental nurse that by presenting the subjects of general nursing in a manner which we think is best suited to the conditions, study will be easier. This volume thus applies both to those who are working for the Preliminary Examination, and to those who are beginning their studies for the Final Examination.

General Principles of Nursing

In the wards of a hospital, the programme depends upon the matron, sister, charge-nurse, or the official responsible to the authorities for the nursing service. What is said in the following pages need not necessarily be taken as a gospel applicable to all conditions; it is indeed impossible to lay down hard-and-fast rules for each and every situation. The nurse may therefore appreciate the fact that the methods described below are meant as a basis of operations. The knowledge must be applied by her to specific conditions, in which it is a matter of common-sense adjustment to the prevailing routine.

The staff of a ward generally consists of a sister, staff-nurse, and several probationers at graduated stages of their education. The subsidiary employees are those who perform the menial but none the less important tasks, and in no wise must these people be looked down upon. They may indeed be as important to the smooth running of the ward as is the sister herself. In all her activities, the nurse should try to keep this in mind and to grasp the main ideas of the scheme of which she is a part. With a clear knowledge of her duties she may then be enabled to make best use of her energies, and so save unnecessary friction or dislocation.

Why is it that some wards run like clockwork, while others are reputed always to be in a fluster? The answer is that in the former case each wheel of the machine is running smoothly, while in the latter there is insufficient co-ordination of the main parts. First and foremost, then, let the nurse make a general survey of the place she has to work in, of the people with whom she has to work, and of the patients for whom her nursing skill is intended. Then let her quietly and carefully make mental notes of the special adjustments required so that she can give of her best; the result will rarely be a failure.

General Duties.—The general duties of a nurse are roughly divided into those of care and cleansing of the fabric and furnishings of the ward, of treatment of the abnormal condition of health which has brought the patient into the hospital, and of maintaining the most satisfactory hygienic state by seeing that food, drink, washing facilities, and sanitary attentions are provided regularly. Some hospitals demand that junior nurses shall do a certain amount of what might be called the domestic duties of the ward; the general idea of most nursing pioneers is that these should be left to the special staff mentioned above, and that a nurse should concentrate on nursing alone, i.e. treatment and hygiene. But let us say that whatever the nurse

may be asked to do, let her do it cheerfully, since it must be evident to her that it can only be a matter of time until the reformation will be complete; the present era is one of transition. Again, there may be conditions in which a certain number of convalescent patients may be available to help in various duties, and provided the sanction of the medical authority is obtained, there is no reason why they should not do something to keep them

Fig. 1.—The Maximum Light is Obtained by the Judicious Placing of Large Windows in this Part of a Ward, which is also Capable of being Shut Off by Glass Partitions.

(Example of enclosed balcony with sliding windows.)

(By courtesy of the Crittall Manufacturing Co., Ltd., London.)

occupied and amused. There are scores of ways in which a nurse may make the best use of the facilities at her disposal. This does not mean that she is to lead a life of idleness while others do the work. On the contrary, it allows her more time and scope to give her special skill to the diseased condition in each patient, and no one who has any lengthy hospital experience will deny that, so far as mental healing is concerned, there is never an end to the work.

Information should always be pooled. Reports even on seemingly trivial matters should be made to the sister, and if the latter is possessed of ordinary wisdom, she will see to it that everybody on her nursing staff is aware of the situation. It is one of the greatest features of a successful ward that the intelligence department is fully organized. And just as in a battle the second-in-command must be ready at a moment's notice to take the place of his chief if the latter is a casualty, and just as every officer in descending order of seniority must be similarly prepared to take the place of his immediate superior, so in the battle for health the nursing staff should be organized on the same plan.

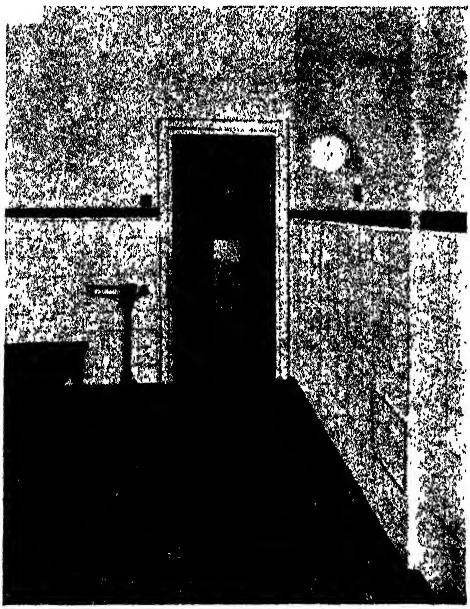


FIG. 2.—EXAMPLE OF RUBBER FLOORING AS USED IN A LONDON HOSPITAL.
(By courtesy of Messrs. Willen Bros., London.)

Discipline may be strict, but a code of rigid rules is the basis of all well-conducted establishments. The nurse must constantly avoid getting into the habit of thinking that regulations are framed to restrict her freedom or to destroy her soul. Demoralization is easy in those who are too sensitive to personal correction, and a demoralized nurse is utterly useless to a patient. In the course of her work, in the hundred and one incidents of the daily round, the nurse is often much more under observation than she may imagine. The lesson to be learned from this is that at all times she should aim at the highest standards and at the display of the best qualities. Her influence is of the greatest value to all who are under her care, and her general bearing is of superlative importance, no matter what kind of job she may be engaged upon.

If a summing-up were asked of the general duties of a nurse, the main points to be made would be steady concentration on

work during working hours, thoroughness in every branch of the duties, co-operation in loyal fashion with the rest of the staff, cheerful and even self-sacrificing attention to patients, and conduct reflecting the highest ideals of self-respect.

Requirements of the Sick-room.—It is an intrinsic part of every nurse's duty to know the contents of her ward, where they

FIG. 3.—A MODERN HOSPITAL SLUICE-ROOM.

The appliances illustrated include: Built-in "Protector" bed-pan washer for scouring bed pans and urine bottles; bed-pan sterilizer; hot-water circulating bed-pan and urine-bottle drying and warming rack; specimen cupboard; mackintosh scouring sink with hinged scrubbing slab, mackintosh rail; and hospital slop-sink fixed clear of floor.

(By courtesy of Messrs. Dent & Hellyer, Ltd., London.)

are kept, and how they are to be used to the best advantage. The maintenance of utensils and instruments, the checking of the various stores, the duties associated with ward kitchens, larders, bathrooms, lavatories, and sluice-rooms, all these come within the scope of the requirements of the sick-room. There may be a need for the direction of ward-maids or others engaged in cleansing of the walls, floors, windows, etc., and the standard to be maintained must always be definite in the nurse's mind so that the desired results may be obtained.

Most wards are centrally heated, but it is always a good plan to become fully acquainted with the system in vogue, and regular and frequent consultation of the thermometer in the ward will ensure that the requisite temperature is being maintained. This should be between 60° F. and 65° F. The best effects of lighting

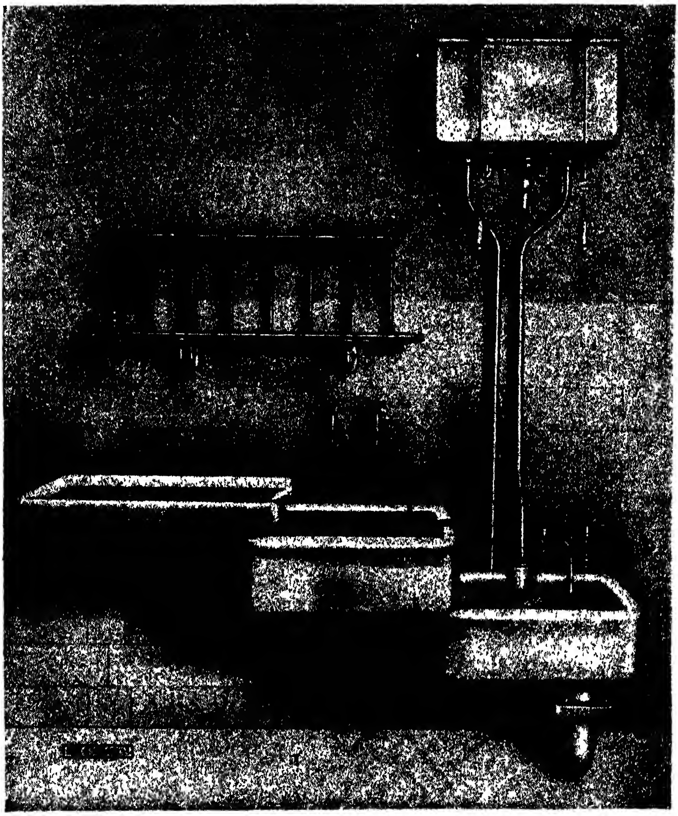


FIG. 4.—HOSPITAL SLUICE-ROOM COMBINATION WITH RACKS.

(By courtesy of Messrs. Dent & Hellyer, Ltd., London.)

and ventilation apparatus should be obtained. All these routine duties must not be matters of reaction to trial and error, but they must be carried out on the nurse's initiative; the power of the imagination must never be held too much in check. Once a reasonable routine is established it is easy to conform to all the standards of ward cleanliness and hygiene.

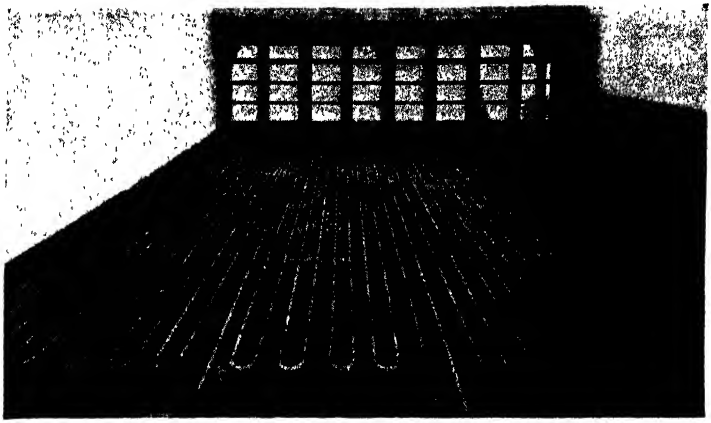


Fig. 5.—A Method of Heating a Large Room by Pipes Laid under the Floor Boards.
(By courtesy of Messrs. Benham & Sons, Ltd., London.)

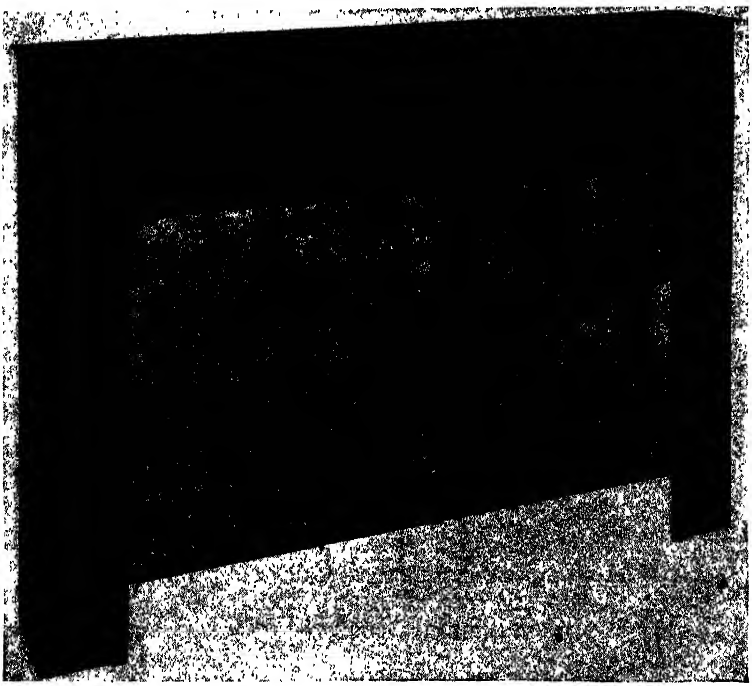


Fig. 6.—Panel Method of Central Heating by Electricity.
(By courtesy of Messrs. Benham & Sons, Ltd., London.)

It may be argued that it is easy to refer to the standards of modern hospitals, and that wards are the simplest sick-rooms known to the profession. And many nurses may complain that conditions in private nursing are occasionally impossible and frequently very difficult. All these observations are appreciated; indeed it is recognized that mental nurses especially may have a very difficult task in the running of a sick-room in a private house on the immaculate lines of the hospital referred to above. But once again let it be stressed that the pattern followed in these pages is admittedly the ideal; and when nurses are fully aware of what is possible, they may be stimulated to improvise and make the best of things when they go out on private work, as so many mental nurses of both sexes do.

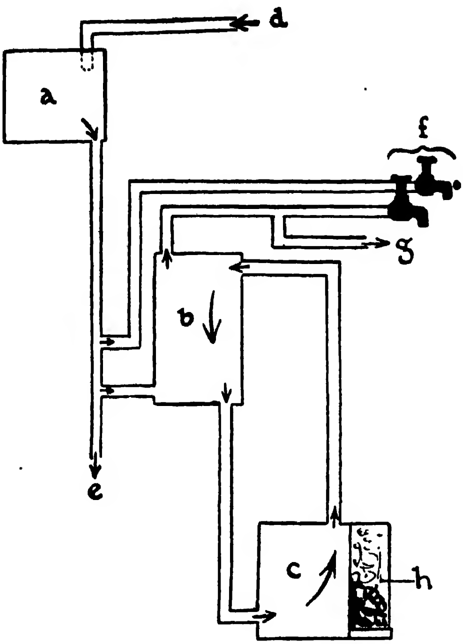


FIG. 7.—DIAGRAM OF THE HOT-WATER SYSTEM OF A HOUSE.

a, Storage tank, supplied by pipe from main *d*. The course of the water is indicated by arrows. Various pipes are led off to supply cold-water taps (e.g. *e* and *f*). One pipe goes to the intermediate tank *b*, supplying it with cold water. The water from *b* passes to a boiler *c* placed in relation to a fire *h*. As the water in *c* heats, it rises to the top of the tank *b*, and can be used at *f* and *g*, which are bathroom and lavatory hot-water taps.

Arrangements for General Routine.—Whether the patient be one of many in a hospital ward or other part of an institution, or attended as a private case by the nurse, there must always be some daily routine. Circumstances alter cases, of course, but a formula of a certain kind is essential if chaos is to be avoided. So far as the hospital ward is concerned, the programme for the day is devised according to the need for nourishment of both patient and nurse, for application of treatment of the diseases represented, and for all the other pivotal procedures which collectively

make up the complete service of nursing. The labours of the day can be performed on a scheme which envisages an intensive preparation of everything pertaining to the ward, so that the latter is by a certain hour in all respects presenting its best front. As a rule the completion of this state of preparedness is coincident with the visit of the medical director of the unit—the individual upon whom rests the entire responsibility for the administration and activities of the ward. It is natural from an ethical and therapeutic point of view that this should

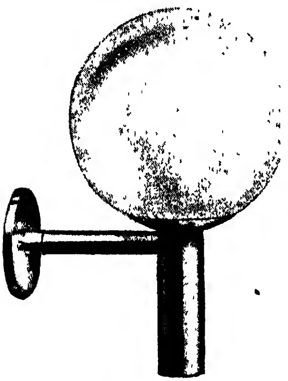


FIG. 8.—SPECIAL WARD-LIGHT FITTING, INCORPORATING A CONCEALED PILOT LIGHT AT THE BOTTOM; THE LATTER IS USEFUL FOR ALL-NIGHT SUPERVISION AND DOES NOT DISTURB OTHER PATIENTS.

FIG. 9.—SPECIAL BED-HEAD FITTING.

It should be noted that such fittings may embody switch plugs, radio plugs, head-phone hooks, bell pushes, call-indicating lights, and fire alarms.

(By courtesy of the General Electric Co., Ltd., London.)

coincide with the demonstration of the nursing measures at their maximum efficiency, thus the doctor's round has come to be a ceremonial clothed in a great deal of polite observances of customs which reflect the most noble and most praiseworthy aspirations of the nursing profession.

If some doubts exist in the nurse's mind as to the futilities or humbug of such visitations she should remember that they are examples of occasions upon which she must show the discipline of mind which recognizes that inevitably she must take her share in a procedure that puts, it may be, a considerable strain on her independence and individuality. She may never bring herself to submit to what may seem to her to be physical and mental

servility, yet there is only one thing to do, and that is to avoid declaring her feelings. Rightly or wrongly, no matter whether the experience is irksome, no matter although it may be clear that constructive and important work is being held up for the

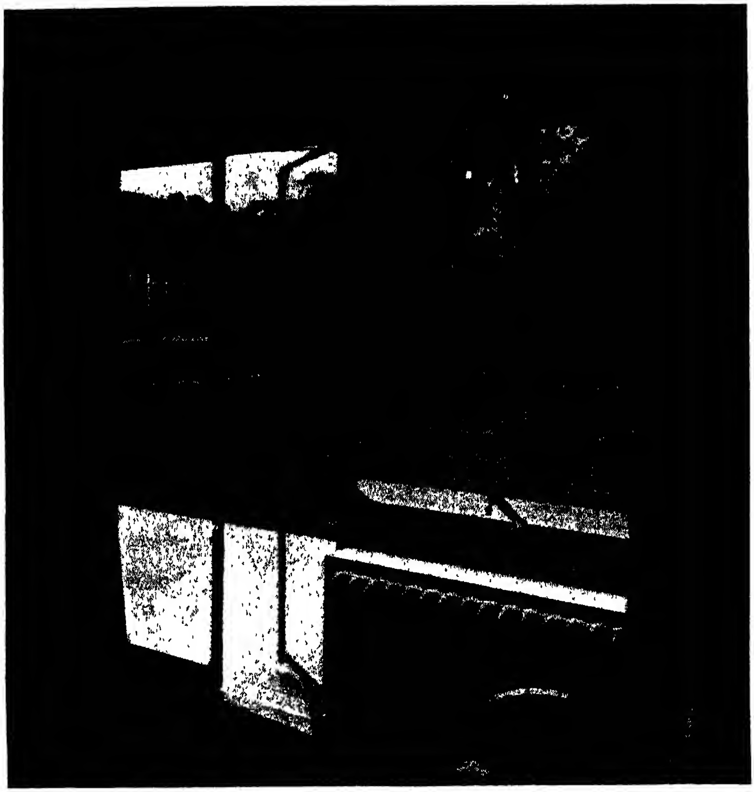


FIG. 10.—MODERN HOSPITAL LIGHTING BY CASEMENT WINDOWS AND DOORS.

Note also the conveniently placed radiator.

(By courtesy of the Crittall Manufacturing Co., Ltd., London.)

period, the inspection must be made, and made according to the long-established custom of medical etiquette. So the best way is to fall into the ranks and willingly participate in the ceremonial parade.

When the doctor appears, he should be met by the nurse in charge or by her deputy, and then things should be so arranged that no hitch occurs during the ward visit. A moment's

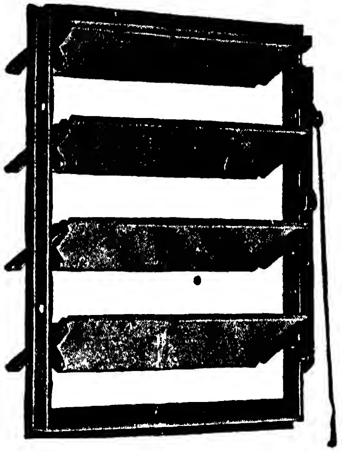


FIG. 11.—GLASS LOUVRE VENTILATION.

(By courtesy of Messrs H. W. Cooper & Co., Ltd., London.)

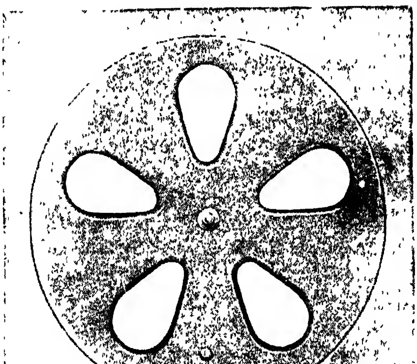


FIG. 12.—COOPER'S DISC.

(By courtesy of Messrs. H. W. Cooper & Co., Ltd., London.)

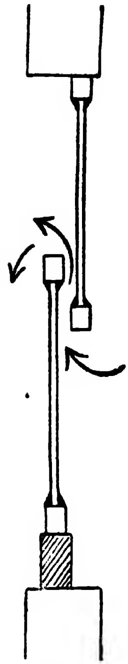
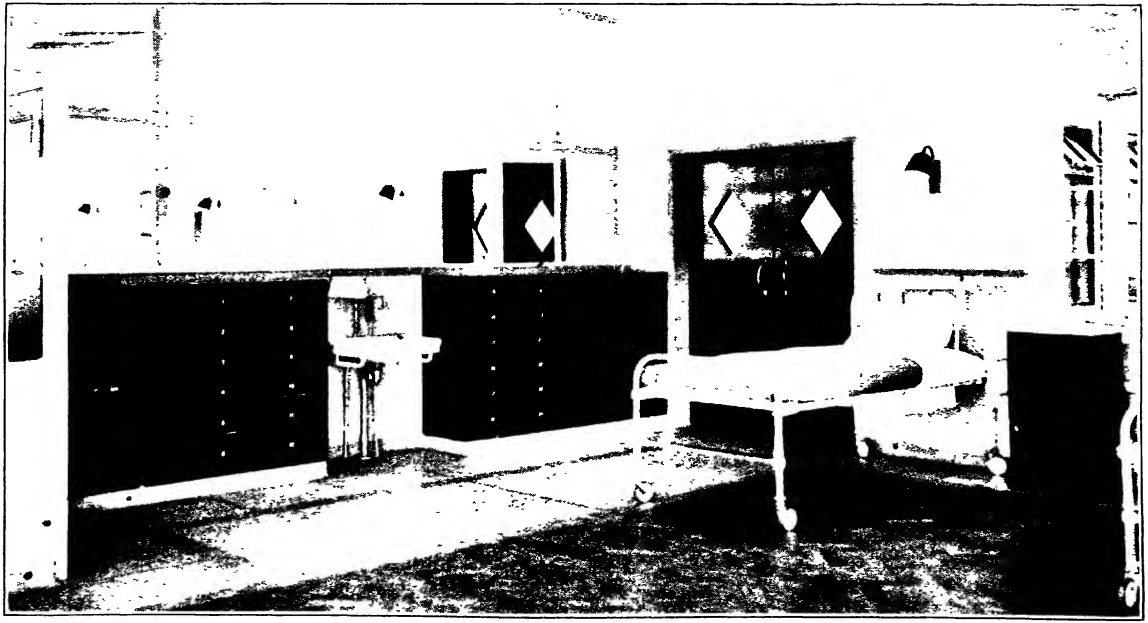


FIG. 13.—THIS SHOWS A SIMPLE METHOD OF ENSURING CONSTANT VENTILATION IN BEDROOM.

(Hinckes-Bird method.) A wooden batten is inserted in the window frame below the lower sash.

reflection will convey even to the most unimaginative person that this involves almost every department of nursing. Each patient must be ready for the doctor; reports, specimens, temperature charts must be quickly available; answers must be given accurately to quickly-fired questions; dressings may have to be removed; instruments may have to be in readiness; notes may have to be taken. Accuracy and not guess-work must dominate the whole situation. In most modern hospitals, there is a convenient room with washing facilities for the doctor, but if not, there must be ready a supply of soap, hot water, scrubbing brushes, disinfectants, and towels, all set ready on a convenient table. The sister generally instructs a probationer to carry round a tray with the common adjuncts to examination. There is no militarism in this; it is merely the most suitable method of putting the whole force of the ward staff at the disposal of the doctor for the time being, and the fact is that in almost every case the system works perfectly.

As the doctor proceeds to the examination of each case, he may be accompanied by the sister and a senior nurse, while one probationer is posted just inside the closed doors of the ward to prevent unnecessary interruption. In the matter of methods of actual examination, there are numerous considerations depending upon the type of illness and the site of the region to be inspected. At a first examination, the doctor may want to make a very thorough investigation, therefore the patient should be prepared for it, a blanket being placed over him under the usual bedclothes. Then the whole of the top coverings can be removed if it is thought necessary. In ordinary daily rounds, however, the main areas can be displayed by the approved methods. In the case of abdominal inspection, the whole of the top clothes can be rolled back in neat folds, and the bed-gown can be pulled up. So far as the chest is concerned, the patient, if he is able, is made to sit up in bed, and his body is well covered with the bed-clothes; then the pillows are placed at the foot of his back, partly as a form of protection against draughts, and partly as a support. The gown can then be drawn up by the nurse and held firmly at the neck while the doctor looks at the chest, care being taken that there is no rubbing of the fabric or rustling of the nurse's cuffs or sleeves, since both these interruptions of the quietude cause harsh and almost deafening noises in the ears of the examining doctor, and prevent him from hearing the finer sounds of the breathing apparatus. When it is desired to expose the legs and feet only for examination, the nurse should loosen the bottom tucks of the bedclothes, and should fold them back neatly in layers as far as the level of the knees or farther. Sometimes, in such cases, the precaution is taken of laying a blanket over the legs until the



THE END OF A WARD, SHOWING ALL-STEEL HOSPITAL FURNITURE.

Hospital equipment constructed of steel has many advantages. It is durable, economical, gives no harbourage to germs, and is easy to keep spotlessly clean with the minimum labour. The enamel can be finished in any colour, and there is minimum cost of upkeep.

(By courtesy of Ronco, Ltd., London.)

doctor is ready, but a skilled nurse ought to be able to expose any part for doctor's examination, and without fuss or untidiness, in less than a minute. Most examinations are done behind screens.

The private nurse in the household should aim at as close a following of hospital routine as is possible in the circumstances. But she must bear in mind always that, in most cases, any form of ceremonial is objected to by relatives and by the patient himself.

FIG. 14.—SHOWING METHOD OF EXPOSING THE ABDOMEN FOR EXAMINATION.

The average private patient has an understanding and familiarity with his doctor that are impossible in the occupant of the hospital bed. The nurse will have to exercise a great deal of sound common-sense and while she will find that the more she can include in her programme the items of the ward regime, the better is it for her system of treatment, nevertheless she must be ready and agreeable to abandon many procedures which are proved to be impossible. Since every case presents its own peculiarities and difficulties, the nurse must be skilled in the art of adjustment and in the art of "making do." Attention to points like these makes all the difference between a good and a bad nurse.

Out-door Methods of Treatment

We have now completed the outline of the management of the ward and sick-room, but there remains the consideration of the special requirements of open-air and other forms of treatment. For many years, it was customary to associate the fresh-air system as belonging to the sanatorium for tuberculosis cases, but

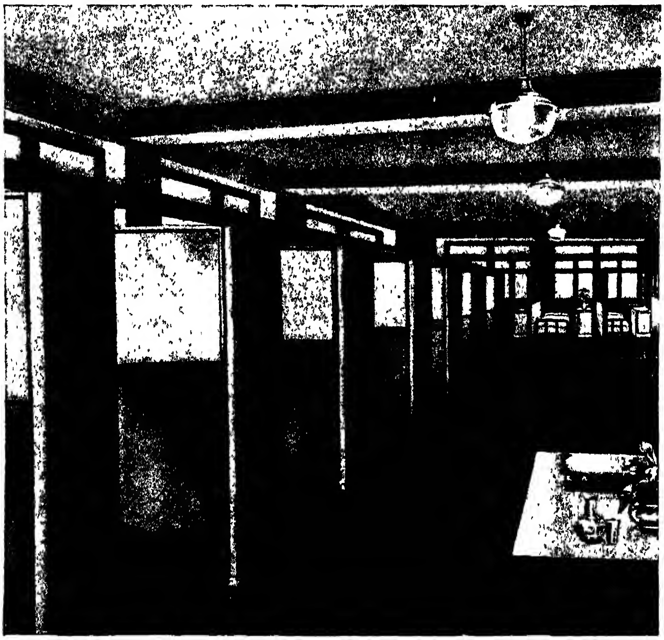


FIG. 15.—THE CUBICLE SYSTEM.

In many hospitals the wards are satisfactorily converted into cubicles, as shown, by the erection of steel screens. Each is provided with a curtain which ensures privacy, if need be.

(By courtesy of Roneo, Ltd., London.)

research and experience has proved that ample supply of oxygen and the influence of the sun are two remedial measures that have good effect in all kinds of cases—surgical, mental, and many others. The modern mental hospitals, in some cases, have the wards planned on the separate room or cubicle system, this allowing the outside wall to be thrown open to the air by pulling back of the window-framework. The patients may then be left in bed with the shelter of the ordinary roof above them, or the

bed may be wheeled out on to a verandah, and the patient thus given the benefit of sun and fresh air for certain periods during the day. The importance of this cannot be over-estimated. Such arrangements are especially good for mental patients. We

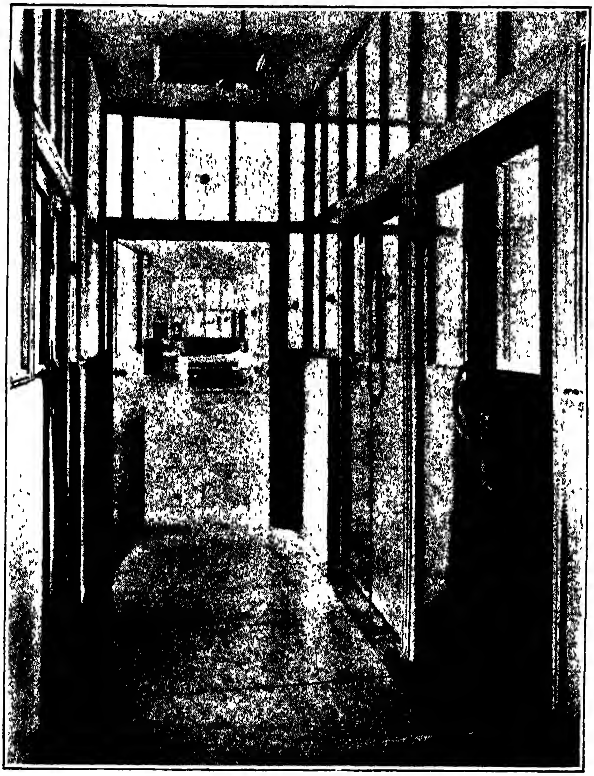


FIG. 16.—WARD AND CORRIDOR, SHOWING PARTITIONS AND DOORS OF STEEL.

This method of construction has the advantage that it provides a fire-proof and easily cleaned system of main division.

(By courtesy of Ronco, Ltd., London.)

may consider briefly the three main methods of verandah, tent, and shelter treatment.

Verandah Treatment.—For patients who have to be kept under supervision, and who must be in the atmosphere of a private room or ward for certain periods, the verandah is the most suitable. As described above, the verandah may run all

the length of the south wall of the ward; it may be almost completely built of vita glass. There is generally a concrete pavement and there may or may not be a shade or canopy above. On a good day, it is customary for the charge-nurse to order the transfer of suitable cases to the verandah, and in the latest hospitals the facilities for doing this are such that the change can be effected in a very short time.

There are several points to be noted with regard to patients being given open-air treatment. The first is that, to begin with, and especially in mental cases, it may be irksome for the patient

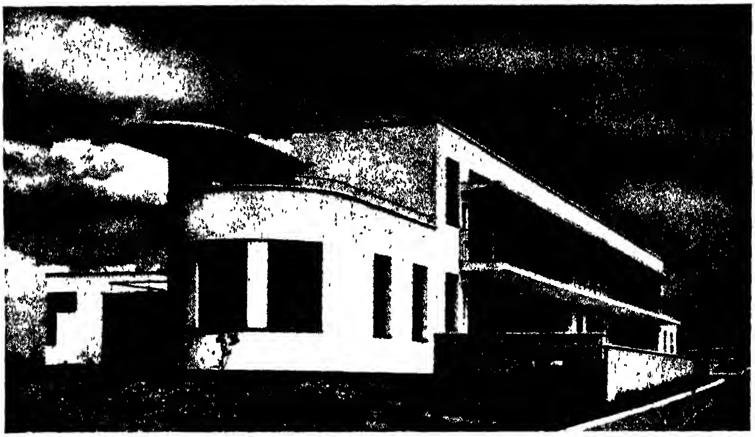
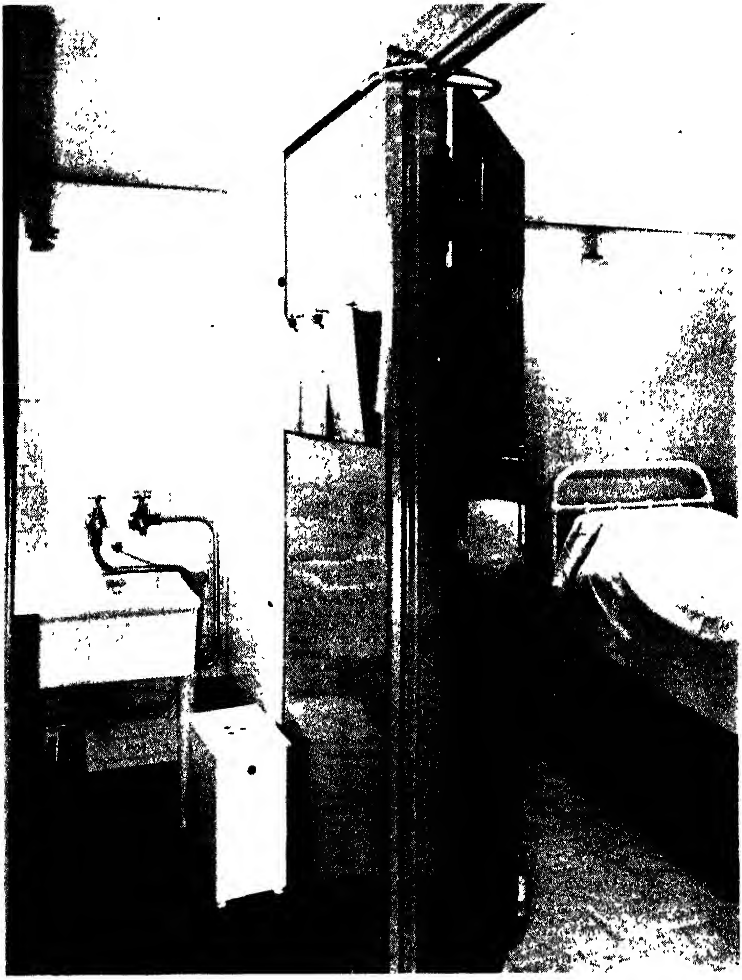


FIG. 17.—A CUBICLE BLOCK WITH VERANDAH.

Example of a method of maintaining privacy together with easy supervision.

(By courtesy of the Crittall Manufacturing Co., Ltd., London.)

to have the sun and air in strong doses. All those who advise us on insolation warn us against sudden and prolonged exposures to the ultra-violet rays of the sun. The correct procedure, therefore, is to study the needs of each patient, and to begin gradually with the treatment. The exposed parts of the body should always be shaded, parasols or other forms of sun-filter being provided; wide-brimmed hats and goggles are generally recommended until it is known how the patient is likely to react. Of course, it must be borne in mind that all individuals have different types of skin; thin-skinned blondes are likely to be affected by a few minutes' exposure to sun in the middle of the day, while dark-skinned people with a thick epidermis may be unaffected even by the strongest rays. However, it is best to take no risks; the correct policy is to make sure first of the type



A PRIVATE WARD WITH ADJACENT SERVICE.

(By courtesy of the General Electric Co., Ltd., London.)

FIG. 18.—EXAMPLE OF A VERANDAH TYPE OF WARD.

Note that the doors can both slide and fold, thus allowing maximum fresh air and direct sunlight into the ward.

(By courtesy of the Crittall Manufacturing Co., Ltd., London.)

of patient under treatment and then to regulate the doses accordingly.

Fresh air is all very well, but unless the patient is properly wrapped up and free from discomfort, the good effect may be lost. Especially is this so in mentally sick persons; the nurse will appreciate that the sensitivity is often intensified, and the slightest influences of the elements—a mere nothing to the normal

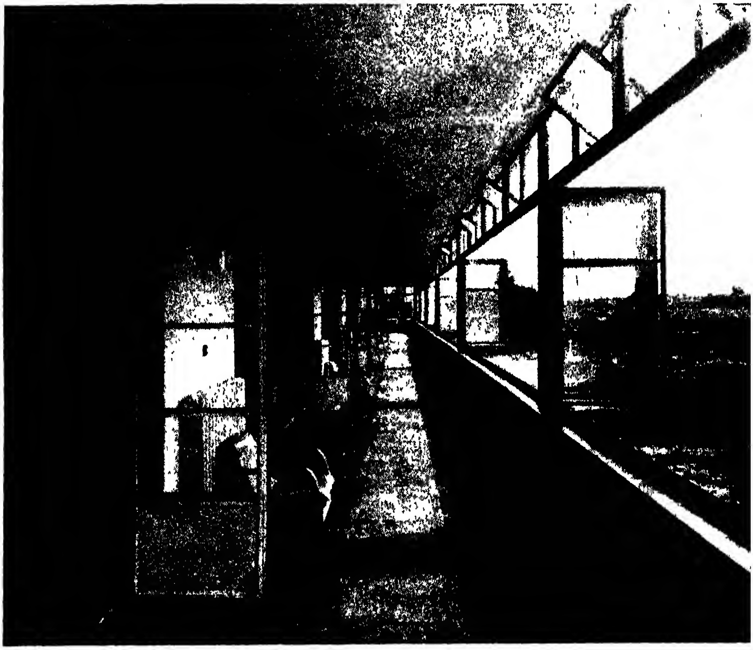


FIG. 19.—OPEN-AIR CORRIDORS, MADE POSSIBLE BY SLIDING AND FOLDING WINDOWS AND DOORS.

Note also the heating and artificial lighting.

(By courtesy of the Crittall Manufacturing Co., Ltd., London.)

person maybe—can have seriously upsetting effects in the mental case. In time patients may become so used to the wind and the rain and the cold, or, for that matter the sun, that they can lie for hours exposed to all the vagaries of the weather, but the nurse's duty is to see that by so doing they are not exposed to elements that are working against the course of the illness. As a rule extra blankets and hot-water bottles, kept constantly at a satisfactory temperature, are necessary in cold weather or during the night.

Nursing in Tents.—Only in serious emergencies (e.g. war or epidemics) is it the custom to adopt the tent form of treatment. Canvas is very cold at night and very warm by day, as all old soldiers know. Various methods are used to overcome this. The tent may have a score of shapes or sizes, and many patterns have been devised. Probably the marquee is the best type, especially that known as the Indian pattern, which has an addi-

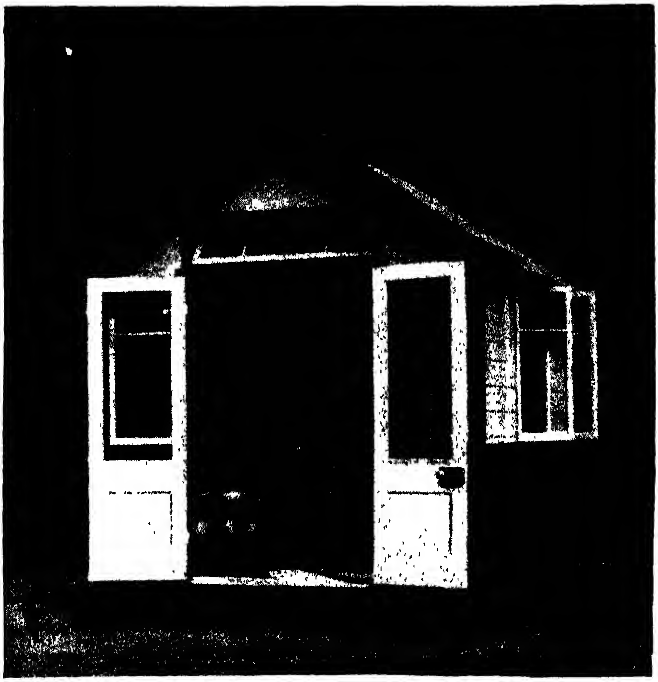


FIG. 20.—OUTSIDE SHELTER COMMONLY USED IN HOSPITAL GROUNDS.
This all-weather sleeping chalet is supplied with revolving gear and Vita glass.
(*By courtesy of Messrs. Boulton & Paul, Ltd.*)

tional lining, and thus the temperature inside is regulated evenly. The great advantage of the tent system is that the site can be changed in a few minutes if need be, and at all times there is plenty of fresh air, owing to the fact that the side curtains can be rolled up, and the patients thus treated practically in the fresh air. The heating of tents is a problem. So far as mental cases are concerned, it is only the mildest cases that can be accommodated in this way, and then merely as a temporary measure, and

it is an added responsibility to the nurses that oil stoves and similar methods of heating are the only things available. All tents should be floored either with wood or with tarpaulin sheets. The latter are quite satisfactory when the ground is smoothed, and they can be kept clean and disinfected. It is always advisable to dig a small trench round the outside of the tent so that rain will be collected and accordingly prevented from running over the floor of the tent. The strictest attention must be paid to

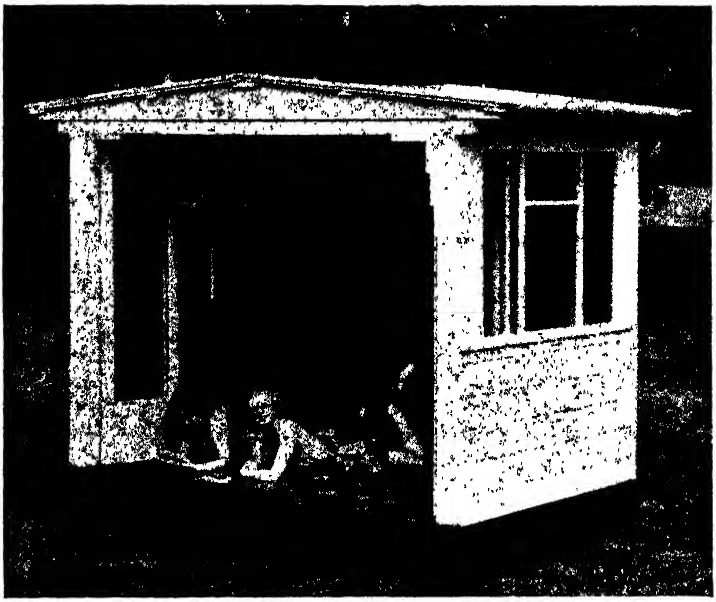


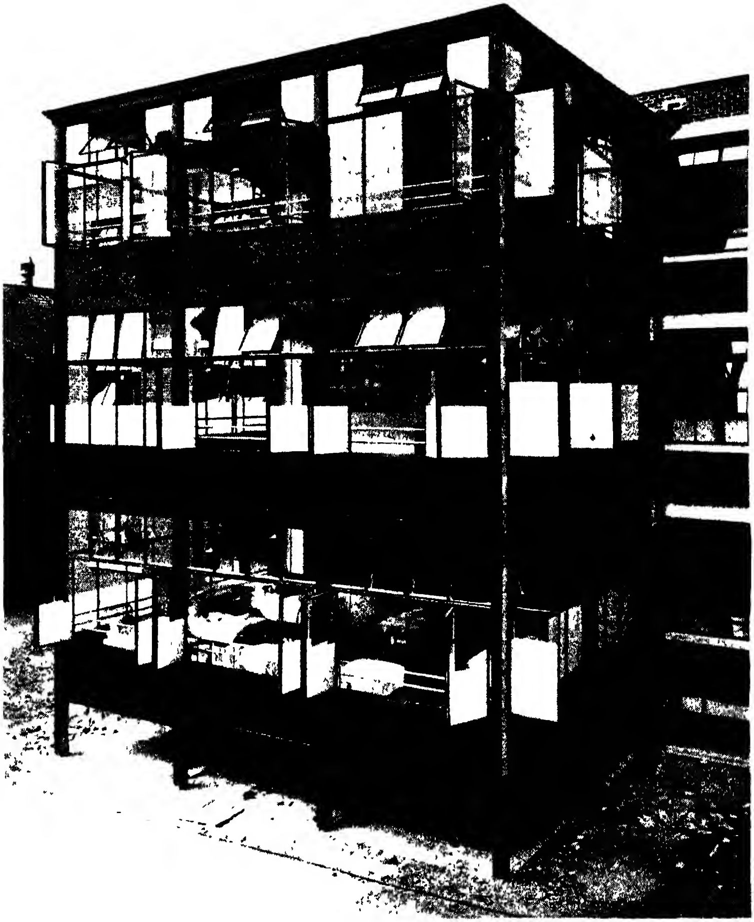
FIG. 21.—ANOTHER EXAMPLE OF A SIMPLE SUNSHINE GARDEN ROOM.

This has folding doors and revolving gear, and an awning can also be attached.

(By courtesy of Messrs. Boulton & Paul, Ltd.)

sanitation and water supply. On the whole, nursing in a tent bristles with difficulties; it is in direct contrast to the smoothness of the machine that is in operation in the up-to-date ward.

Nursing in Shelters.—Hospital and private patients may be treated in shelters, which are detached wooden huts with one or two sides incomplete. In certain special hospitals, in Germany, in America, and in Great Britain, there are rows of such shelters side by side, so that the effect is that of having an open-air ward as a permanency. The best models are those which are constructed on a swivel, so that the patient may be protected



A Special Sun Balcony Built Out from a Hospital Block

All types of window are illustrated here; note the upper fanlights, which are controlled by screw gearing.

(By courtesy of the Crittall Manufacturing Co., Ltd., London.)

from the prevailing wind, and may catch the sun with the rays at the most propitious angle. The roof should be rain-proof, and should yet be such that it does not collect heat. Corrugated iron, for instance, may be water-tight, but it is hot, and causes stuffiness in summer, and it is distractingly noisy in rain. The structure of such huts, however, is the concern of the hygienic engineer rather than that of the mental nurse. As in the verandah cases mentioned above, it is essential that provision should be made for protection against cold, wet, excessive heat and sun, and strong winds.

In the case of private nursing, a hut may be erected in the garden; certain makers specialize in the manufacture of suitable types of this form of shelter. On the other hand, the nurse may discover that she has to devise a method of treating her patient in his own room, and yet of providing him with the best facilities for getting abundance of sunlight and fresh air. In the ground-floor room which has a French window, there are many possibilities, but even although the alterations mean simply the removal of an ordinary sash-window *en bloc*, it is a step in the right direction. The patient's bed can be drawn up close to the window, and again the protection against the caprices of the weather may be arranged for by having plenty of warmth in the room and the bed, or by clothing the patient satisfactorily. It may be mentioned at this point that the Balaclava helmet, with thick woollen gloves for the hands, is a suitable outfit for fresh-air patients in winter-time, especially during the night.

As in other abnormal cases, the arrangements to be made in regard to nursing of "open-air patients" must be determined according to the special circumstances. The nurse may have to decide upon her system only after trial and error have established certain definite lines, and in every instance, of course, the individual peculiarities of the patient must be taken into account and allowed for. Especially do such principles apply to mentally afflicted persons, the special treatment of whom we consider in Vols. II and III.

CHAPTER 2

DOMESTIC WARD MANAGEMENT

METHODS OF CLEANING. THE DAILY ROUTINE. CARE OF FURNITURE. WORK IN THE WARD ANNEXES. CARE OF BEDDING, LINEN, BLANKETS, AND WATERPROOFS. SANITARY METHODS OF CLEANING UTENSILS, CROCKERY, ETC. CARE OF THE KITCHEN. DISPOSAL AND DISINFECTION OF SOILED LINEN AND DRESSINGS. REPORTS.

EVERY general hospital has its own architectural peculiarities, and changes occur so rapidly that the up-to-date ward of to-day may be obsolete to-morrow. Generally speaking, however, the ward in most hospitals, apart from cooking and some special services, is a complete and self-contained unit, with commonly twenty beds in the main apartment, or ward proper. There are conveniently situated service rooms, including ward-kitchen, where special cooking can be done, linen room, stores room, doctors' room, lavatories and bathrooms, with special apparatus for the disposal of excretions, and one or two private rooms for special cases.

Methods of Cleaning.—Twenty years ago, the work of the average probationer consisted of the performance of the most menial tasks in the ward. The beginner to-day finds that things have been altered considerably within recent years. The cleaning of the ward itself is left in most cases to the ward-maid, while the nurse has more to do with the personal cleanliness and the hygiene of the occupants. Routine is established by the sister, who is responsible for the administration of the ward. If her orders are faithfully carried out, the ward should run without a hitch. Neatness should be one of its main attributes; there should be " a place for everything, and everything in its place." The contents of a ward vary according to the government of the hospital, but fundamental articles of furniture are beds, wire mattresses, bedside tables, chairs, ward-tables, sister's desk, and various sundry utensils. The bedding, utensils for feeding, etc., and the other things in use every day usually belong to the side-rooms, and are dealt with later.

A ward is like a room in a house; its condition is a reflection on the standard of its directress, and the more work put out on it,

the more does it demonstrate its cleanliness. The floor may be laid with linoleum, it may be of parquet or rubber or of ordinary planed wood, or it may be of special composition. Most of the modern hospitals are constructed of fireproof and soundproof floors and walls. The latter must be washed periodically, especially near ventilators, and round about windows. The doors, windows, and blinds must be regularly cleansed, and if there is an open fire, the chimney should be swept at intervals. Some hospitals have a special staff to deal with the ceilings, windows, and the higher part of the walls. The daily routine concerns only the floor, doors, and the walls up to a height of about six feet. In some cases long-handled feather dusters or mops are used to keep the walls and ceiling regularly free from dust. When a "spring-cleaning" has to be done, the ward is cleared of patients. Mental nurses will bear in mind that these words apply to hospitals generally. In Vol. II,

FIG. 22.—HYGIENIC METHOD OF CLEANING THE FLOOR OF A WARD OF A LONDON HOSPITAL BY USING A VACUUM CLEANER WHICH IS NOISELESS AND WHICH ALSO DISINFECTS AS IT OPERATES.

(By courtesy of Electrolux, Ltd.)

Section III, the special features of mental hospital structure and equipment are dealt with.

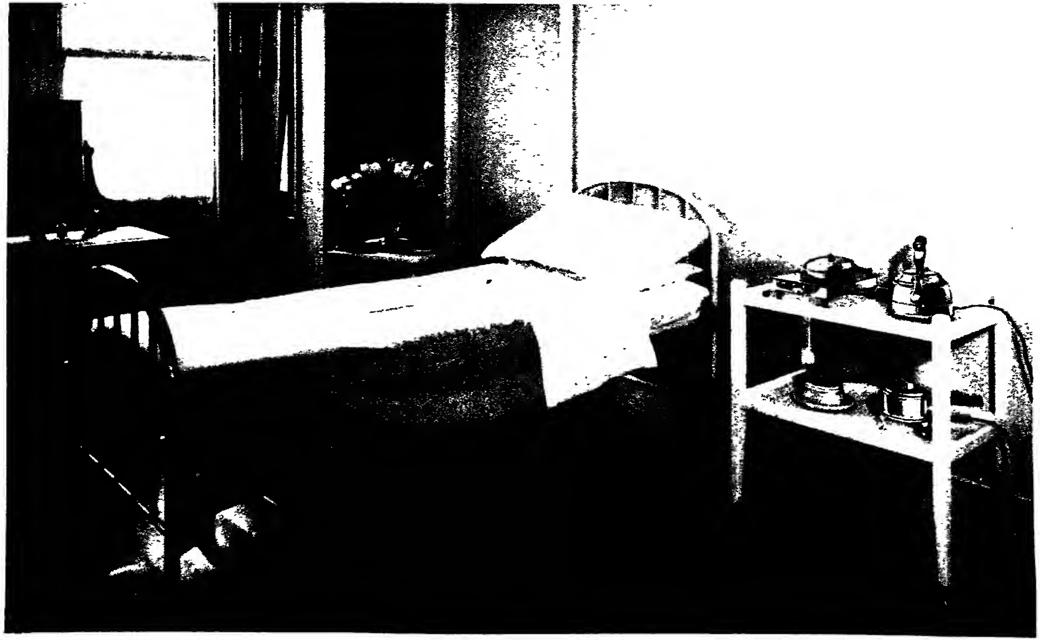
Daily Routine.—No attempt is made in the following pages to lay down hard-and-fast rules about cleaning of the ward every day. The routine depends upon the ideas of the sister and upon the circumstances in which the hospital is placed. Everybody aims at a perfectly hygienic ward, but the happy medium must be struck between extreme cleanliness and the setting up of conditions which may cause disturbance of the patients.

FIG. 23.—A NEW TYPE OF FLOOR POLISHER IN USE IN MANY HOSPITALS.

(By courtesy of Electrolux, Ltd.)

Cleaning does not begin until all the washing has been done, and the general refuse collected from each patient; every nurse knows how papers, empty cigarette boxes, and other waste collect from the night before. The beds are made early, and by the time the floors are ready for sweeping the ward has been tidied up. The care of the ward floor is often a special pride of the wardmaid, but convalescent patients usually lend a hand, and most floors are superlatively clean and smooth. As a general rule, the floor is treated with a thin layer of beeswax and turpentine, but this does not require much renewal if the polish is kept up and if dust is not allowed to be ground into the dry wax. Modern polishers with electrical action are entirely satisfactory, particularly those which have been especially devised for hospitals, as illustrated. The old-fashioned heavy flannel polishers worked by hand at the end of a stout pole are still much in use however.

The usual procedure in cleaning the floor is to lift the beds, accompanied by the lockers and chairs, to the centre of the ward,



INTERIOR OF AN "ALL-ELECTRIC" ROOM IN A NURSING HOME.

Showing how electricity can be used in nursing. On the table at the right-hand side of the bed is a Bandolero fan. The trolley on the left-hand side contains, on the top shelf, a 150-watt copper warming plate and a 650-watt Magnet kettle of nickel plate. Below is a small boiling plate and a 300-watt saucepan, useful for heating milk and other fluids.

(By courtesy of the British Electrical Development Association, Inc., London, and the Scottish Nursing Home, Maida Vale.

and then the side portions are sprinkled with moist tea leaves, with sawdust, or with fibre, and carefully swept. Occasionally a disinfectant is used to wet these adjuncts to cleaning; this is an antiseptic measure and keeps down dust. The furniture is then replaced, and the central passageway is swept. Once or twice a week the floor may be treated with polish, and finally rubbed until it shines like a mirror.

Care of Furniture.—A thorough dusting is now indicated, every article in the ward, fixed or movable, being treated first with a damp duster. The finishing touches can be done with a dry duster of special quality which is harmless to highly polished and plated metals, and cleansing to the plate-glass tops of shelves and lockers. The cleaning of dressing trolleys, etc., is a special matter, and need not be done in the ward. Once a week at least, the chairs and lockers should be scrubbed, and the beds wiped with a cloth soaked in disinfectant. Sponges are excellent for this type of work, and they ought to be in more general use. The windows can be kept clean by using a wash-leather, on which has been sprinkled a little finely powdered whitening. The importance of this in allowing the maximum light into the ward cannot be over-estimated. In many cases, the sputum mugs are removed and cleaned, then returned. Any mugs or feeding utensils should be taken away. The electric light bulbs require

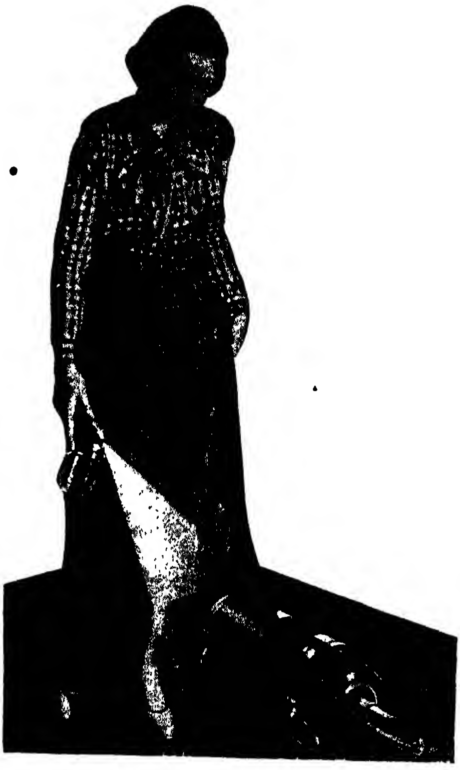


FIG. 24.—MODERN METHOD OF CREATING AN ANTISEPTIC ATMOSPHERE ON FLOOR COVERINGS BY SPRAYING DISINFECTANT, THE DRIVING POWER BEING OBTAINED FROM A VACUUM CLEANER.

(By courtesy of Electrolux, Ltd.)

to be carefully handled, and they should be cleaned with a soft dry cloth used for glass-ware. The paint may be washed at intervals, for which ordinary soap and water are used, but no washing soda should be added, as it takes the surface off the paint. It should be a nurse's duty to have a final "tidy-up" after all the sweeping and dusting is done. Patients' private possessions should be neatly arranged in the lockers; each of the latter should be left in an orderly state. Flowers and plants, which have been removed from the ward the night before, may be returned to their proper places in the ward. It cannot be too greatly stressed how far-reaching is the moral effect of a neat and tidy ward. Even the adjustment of the blinds and the arranging of the few movable articles on shelves, mantelpieces, and window ledges, including flower glasses, make a tremendous difference to the atmosphere of the ward. A tactful nurse can soon enlist a few lieutenants in her service; these can spend an hour of their convalescence doing jobs to their liking, e.g. polishing the brass, or improving the surface of the floor. In many convalescent wards, the majority of the work is done by the patients themselves, and there could not be anything better for them.

Work in the Ward Annexes.—The small rooms attached to the ward and used as stores, lavatories, kitchens, etc., may now be dealt with in turn.

The Sluice-room, when it exists apart from the lavatories, is usually tiled on floor and wall, and generally made to stand the application of a hose if necessary. It is fitted with special sluices for washing out urine-bottles and bed-pans, and may have a slate-covered table for the washing up of various sanitary utensils employed in the wards. This room requires special treatment with strong disinfectant daily, and with the lavatories may be dealt with by a trained male staff, which deals with each ward in turn. The utmost care should be taken to keep the floor, walls, furniture, and fittings free from germ-carrying material, and the sinks should be maintained clear of any material likely to choke the traps.

The Lavatories and Bathrooms are usually constructed on much the same principle as the sluice-room, and therefore require the same system of cleansing. All urinals for males, and w.c.'s, should be thoroughly cleaned as often as necessary. The more these offices are flushed out the better, a strong disinfectant such as amphyl, lysol, izal, or other phenol product being employed. It is wrong to put things other than excrement down the closets; cotton-wool, dressings, lint, etc., should be incinerated.

The Kitchens, Linen Rooms, Stores Rooms, and Doctors' Room need not have the same disinfection as the above. They generally conform to the plan used in the ward.

Care of Bedding, Linen, Blankets, and Waterproofs.—The supervision of the textile fabrics used in the ward is generally delegated to a senior nurse, who may have a probationer to help her. In any busy ward, there is a constant changing of bedding and other linen, and the linen cupboard is one of the most important depots of the establishment. The stock depends upon the resources of the hospital; a certain inventory is supplied to each sister, and she must see that it is maintained. It is therefore the rule to stamp each article clearly with marking ink, and

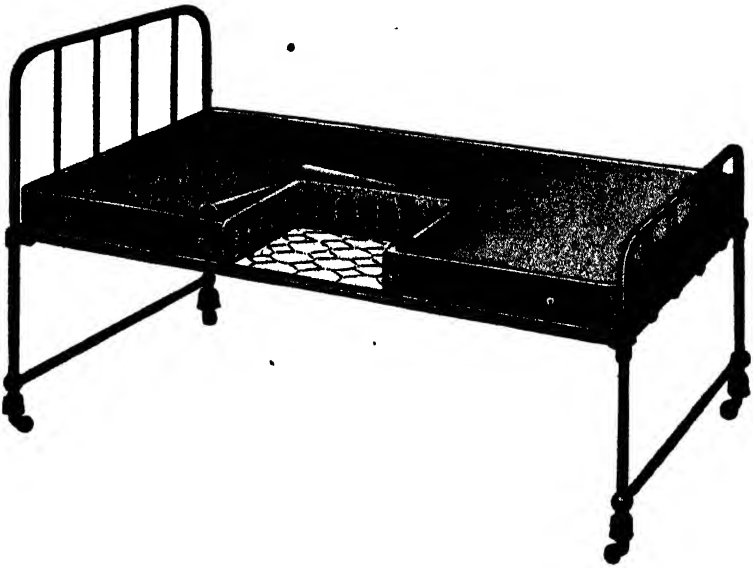


FIG. 25.—SPECIAL RUBBER MATTRESS IN HOSPITAL SHEETING COVER WITH SECTIONAL VIEW SHOWING CONSTRUCTION (DUNLOPILLO).

(By courtesy of the Dunlop Rubber Co., Ltd.)

sometimes distinctive emblems are embroidered on the hems. It is impossible to lay down any fixed scale of linen-supply. In the steward's store, which is the quartermaster's supply depot for the whole hospital, a certain reserve is kept of beds, wire mattresses and covers, hair mattresses and covers, and pillows. In the linen-room of a twenty-bed ward, we might expect to find 70 pillow-covers, 120 pillow-cases, 50 counterpanes, 80 blankets, 100 sheets, 100 draw-sheets, and 30 waterproof sheets. Towels both for bathing and washing might amount to 130, while the regulation clothing for patients usually consists of half a dozen dressing-gowns, 40 handkerchiefs, 30 face flannels, 80 night-gowns, the same number of vests, and 50 bed-jackets. In addi-

tion to this list there may be certain personal articles of clothing belonging to patients. It will be understood that a large proportion of this stock is either in use, or at the laundry or sewing room, where all the major repairs are carried out, and the whole stock can never be reviewed at one specified time. Therefore it is an important duty to see that the linen is efficiently distributed, kept in good condition, and replaced when worn out. The above stock-list is not laid down as a fixed supply; it may be that in some hospitals the linen is reduced to a minimum at the wards, but as a guide to equipment of a twenty-bed ward it will

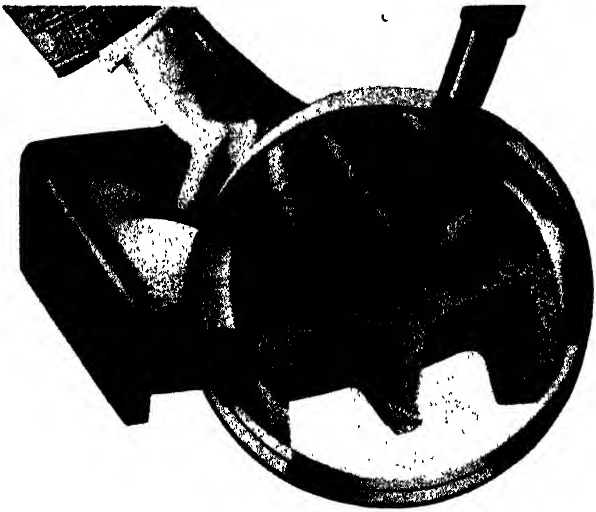


FIG. 26.—NEAR VIEW OF RUBBER MATTRESS (DUNLOPILLO), SHOWING CONSTRUCTION.

(*By courtesy of the Dunlop Rubber Co., Ltd.*)

suffice to indicate roughly how many of each article are necessary for efficient service. In special cases, more sheets, waterproof sheets, and patients' clothing are essential. For instance a surgical ward, or a ward dealing with children or with bladder cases, obviously requires an almost unlimited supply. There is never any difficulty in getting extra equipment, of course, as the steward keeps a large reserve for emergencies. The nurse in charge of the linen is responsible that each article when it is taken from the laundry basket is checked with the list sent out, that it is in good condition and repair, or if not, that it is condemned and replaced. She should be able to account at any time for the whole inventory in her possession.

Blankets are washed only at intervals, as they tend to shrink. When they are past ordinary use, they can be used for mattress covers, or for making hot-packs, etc. During the summer, spare blankets are usually taken into the steward's store and carefully protected against moths.

Mackintoshes (waterproof sheets) require special cleansing. They should be well scrubbed with hot water and soap on a smooth scrubbing board, and then rinsed with a disinfectant. Some nurses use a little methylated spirit. Mackintoshes must not

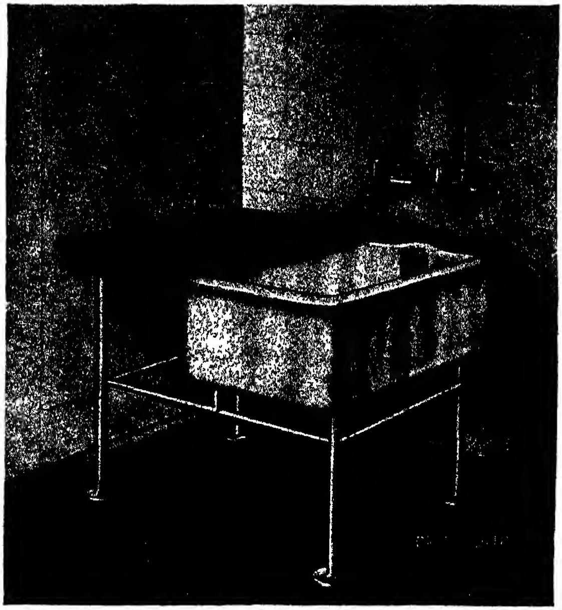


FIG. 27.—MACKINTOSH SCRUBBING COMBINATION WITH TEAK DRAINER.
(By courtesy of Messrs. Dent & Hellyer, Ltd., London.)

be folded; therefore after drying on a wide roller they should be put away rolled up on a wooden roller. It is advisable to dust them inside with fine talcum starch and zinc-oxide powder.

The general principles governing the care of linen, bedding, etc., are established in order to effect economy as much as need be. When possible, stains should be immediately removed, otherwise they may become a permanent disfigurement; all linen should be kept dry, in specially aired and heated cupboards; if a patient is sick or incontinent, the sheets and bedcovers should be protected by waterproof sheeting; at intervals mattresses

must be brushed or cleaned by a vacuum machine. Linen may be stained by various things. Fresh blood is best dealt with by soaking in tepid water and gently rubbing the fabric. When all the colour has gone, wash with soap and water and rinse well. Dry blood is dissolved by hydrogen peroxide well rubbed in; it should be washed out carefully afterwards. Iodine is perhaps the commonest stain. A solution of phenol is often used to remove it, but it can also be diluted by surgical spirit applied at once. Often blankets show evidences of yellow picric acid, which cannot be removed from wool, but other textile fabrics may be dealt with by ordinary washing. Anything of a greasy nature, such as vaseline, ointments, etc., can be absorbed by the old-fashioned use of a hot iron and a layer of blotting paper. Ether is a solvent of oils, as also are benzene and petrol, but all must be used with the greatest care and far from open flame or fire, as they are so easily inflammable. The stains must be well rubbed, otherwise a circular "tide-line" is left. Tea, coffee, and cocoa stains are frequently found on the tops of sheets and down the front of bed-gowns. If steam is forced through the stain, the latter will disappear.

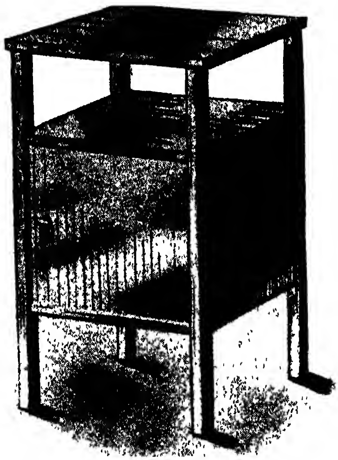


FIG. 28.—AN EXAMPLE OF A MODERN STEEL BEDSIDE LOCKER, WITH PLAIN TOP.

Glass covers can be provided.

(By courtesy of Roneo, Ltd., London.)

Sanitary Methods of Cleaning Utensils, Crockery, etc.—When utensils and equipment are removed from the ward, if they are not expendable they must either be disinfected first and washed afterwards, or simply washed and put away. A summary of the things dealt with in either or both ways includes feeding-cups, mugs, spoons, forks, knives, cups, saucers, plates, porringers, sputum cups, kidney-trays, urinals, bed-pans, urine specimen glasses, glass and porcelain dishes, teapots, feeding bottles, brushes and combs, instruments, glass-ware, crockery, milk-jugs, milk-pails, condiment dishes, and many other sundry articles in constant use. Sometimes feeding utensils are grouped on a tray, separately disinfected by boiling, or simply washed. The instruments and other dressing utensils are kept by them-

FIG. 29.—STORAGE OF FOODSTUFFS BY REFRIGERATION.
Note also the method of making ice cubes.
(By courtesy of Electrolux, Ltd.)

selves and specially washed after being disinfected. Their disposal is fully dealt with later on at various suitable points. If a disinfectant is used with glass or crockery, it must be completely removed, especially when dealing with feeding utensils. In most hospitals, there is an abundant supply of boiling water, and even of steam, so that we are assured of proper sterilization and cleaning of every article. In the sluice-room, the bed-pans, urinals, urine test-glasses, sputum mugs, kidney-basins, enamel basins for vomited matter, and other enamel-ware soiled by use can be cleaned first, then washed well with washing soda and water.

The feeding utensils, after careful washing and drying, should be put away neatly in their respective places in the kitchen. Special attention should be paid to the spouts of feeding-cups; a small wire brush is useful. In some cases, steam cleansing of crockery and drying by placing the utensils in a rack is the rule.

In many wards, a check is made of the equipment once a month; this is in addition to the steward's annual stock-taking.

Care of the Kitchen.—As a general rule, the ward kitchen contains a slate-covered table, gas cooker, and cupboards. Adjacent may be a pantry and larder. All foodstuffs should be kept free from flies and should be carefully covered up. The food is supplied from the main kitchen of the hospital, but there may be special little things for certain patients, and these belong to the ward. The dry stores are supplied once a day. Bread should be kept in a large bread-box, often made of enamel-ware. As a daily routine, it should be cleared of crumbs and scraps, which are collected as pigs' meat. Twice a week, the bread-box must be emptied out and thoroughly washed with soap and water, then carefully rinsed with boiling water and dried before the bread is returned. Special care must be taken with all milk-jugs and pails, as milk is easily tainted, and is one of the most important articles of diet. All such receptacles should be thoroughly rinsed with cold water in the first place, a special hard brush being used, so that not a particle of the old milk remains; then boiling water should be used to wash them out. After that they can be turned upside down on a drying rack. No towel is necessary. All fresh milk should be stored in the larder. Most of the milk is supplied in glass bottles, and is pasteurized. The ideal method of storage of food or milk is in a refrigerator, and most hospitals are now in a position to provide this. It should be the aim of every good nurse to see that the food is delivered to the patient in an attractive way. The trays should therefore be scrupulously clean, the salt cellars, etc., tidy, and the utensils bright.

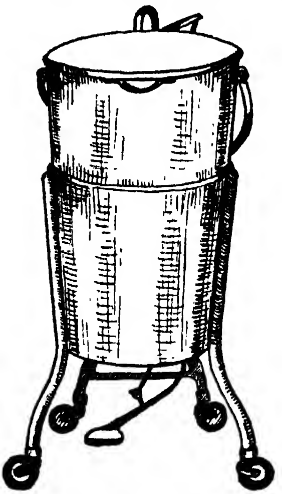


Fig. 30.—Bucket for Soiled Dressings Operated by Pedal Lever.

Disposal and Disinfection of Soiled Linen and Dressings.—All soiled dressings are put into a special enamel bucket with lid, and when in this has been collected discarded lint, gauze, cotton-wool, etc., for the day, the contents can be incinerated. The bucket is disinfected in the usual way, and kept in the sluice-room. When mackintosh material, crockery, linen, and other non-expendable stuff have been infected by septic matter, they should be soaked for twelve hours in strong lysol or other disinfectant, and while the crockery should be boiled for half an hour, and the linen sent to the laundry, the mackintosh must be treated specially as described above. In certain cases of severe

infection, especially in the fevers which occasionally break out in a ward, the bedding, mattresses, pillows, etc., must be sent away for steam disinfection. Rubber or leather goods must not be dealt with in this way, as they are perishable.

Reports.—The day sister, coming on at a certain hour, takes over from the night nurse, receiving her written report, and hearing sundry verbal reports about patients. She then goes rapidly round the ward with the night nurse, and compares notes, finding out about the progress, condition, and sleep of each. The patients look forward to the morning visit of the sister. Once the night nurse has gone off duty, the sister decides how the day is to be occupied, but the routine performance of various duties is simple, because each nurse knows her job and is able to carry it out. A sister possessed of good administrative powers will see that the hygiene of the ward is sound, and that the morning "toilet" of the ward proceeds apace. Any abnormal development is reported to her, and receives her attention. Meanwhile the ward is prepared for the house-doctor's visit, which is usually at 10 a.m. The allocation of duties in the morning is a matter of the rule existing in various hospitals; in some cases, the night nurse does a certain proportion of the patients' toilet, bed-making, etc., but this may be left till after breakfast, which is usually one of the first incidents of the day. Before the arrival of the house-physician or surgeon, the sister should collect information which should be such that she should be able to tell the doctor practically anything of note that has happened since he last visited the ward.

By dinner-time, which is usually noon or 12.30, the most important work of the ward ought to have been done. The patients are washed after dinner, which is served by the nurses from the kitchen, the sister supervising the distribution of the food. Probationer nurses take urinals and bed-pans to those who require them. The afternoon should be spent quietly; operations may be done, which certain nurses attend, or visitors may call on approved days. The ward never ceases to be a hive of industry, and description falls far short of the impression conveyed by actual experience. The successful sister is one who has reached a stage at which although she holds many reins in both hands, she must yet be ready for more; she must be prepared to accommodate herself to the slightest breakdown, and she requires the patience of a saint. Tea for the patients is a simple meal, followed by recreation for those who can take it. Wireless is a great benefit in wards. After tea, patients newly admitted may require to be put to bed, their particulars taken, and arrangements made for the complete investigation of their case as soon as possible.

The first thing the night nurse gets is the day report. This

tells her in full the events of the day, each patient being mentioned personally. Special details are given about new patients, and about those critically ill. One of the great functions of the night nurse is to get her charges "settled." Between 8 p.m. and 10 p.m., inmates of a ward are always restless; some cannot sleep, and require drugs; others are in pain; helpless patients must be watched in case they slip too far down in bed or dislocate bandages or splints. The night nurse acts in a conservative way if possible, leaving all but the pressing work to the day staff. Sometimes she has to deal with emergencies like acute abdominal inflammation, or with hæmorrhage. By the time the house-doctor calls round for his last visit, the night nurse should have obtained a good idea of the condition of each patient, and she ought to have a list of questions to put to the doctor about anything that has seemed to her to be abnormal. It is better to keep a house-surgeon half an hour at midnight than to drag him out of bed at 4 a.m. During the night, the nurse may have to attend to the sanitary arrangements, to mark the four-hourly charts, to prepare dressings, etc., for the stores room, and she should make sure that the temperature is maintained all night at a regular level. She is periodically visited by the night sister and her assistant, to whom she may apply for any help in deciding on any unusual course of action. Nurses should remember that they are not expected to take any responsibility beyond their own sphere of work.

The above is a mere outline of the day's work in a general ward, and, no doubt, there are hundreds of variations in routine. It must be stressed that the only way to appreciate the work of a ward to the full is to play an integral part in its activities for a long spell. A nurse at the end of her training has amassed an amount of knowledge by experience alone that cannot be imparted by a textbook, however complete the treatise may be.

CHAPTER 3

GENERAL CARE OF THE PATIENT

ADMISSION TO THE WARD. LIFTING AND TURNING PATIENTS. DETAILS OF TURNING. BATHING. IN THE BATHROOM. THE BLANKET-BATH. FINAL DETAILS. SPECIAL TREATMENT OF CERTAIN PARTS. CARE OF THE BACK. HANDS AND FEET. HEAD AND HAIR. TREATMENT WHEN VERMIN ARE PRESENT. MOUTH AND TEETH.

THE success of a nurse's work very often depends upon the possession of that quality which is given to some and denied to others, which has as much power as the remedies of the pharmacopœia, and which is often uncanny in its achievement—*Personality*. It is the charm which does the trick when all other efforts fail.

Admission to the Ward.—In the absence of any instructions about early treatment on the admission card, preparations should be made to give the patient a bath. Usually the sister of the ward issues her orders about this on being informed of the arrival of the "admission." Some people may not be in a fit state for immediate bathing, and may be put to bed as they are, the bed being covered with an old blanket and mackintosh until emergency treatment has been done to enable the patient to be properly washed. In most cases, however, the patients arrive with night-clothes on, and can be put to bed, where they are blanket-bathed (see below). The other possibility is that the newcomer may walk in, and that he may be able to have an ordinary bath under supervision. While the bath is being prepared, the nurse can observe the temperature, the pulse, and the respirations, and make a general survey of the case. Anything unusual should be reported to the sister. When the patient has been settled comfortably in bed, there are certain formalities to be carried out. If he cannot give particulars himself (e.g. in critical illness or unconscious states), he must not be disturbed. The usual procedure is to keep one of the relatives—wife, mother, or father—waiting outside the ward, then when the patient has been left in the charge of another nurse, the admitting nurse takes a note of the following particulars: (*a*) The personal effects, keepsakes, valuables, etc., brought by the patient; (*b*) the address

of the next of kin; (*c*) the full name, address, age, occupation, of the patient; (*d*) the history of the case, including family history, the personal history (noting the previous illnesses, kind of work, habits, etc.), and the present illness, with details of the symptoms in series. In other words, the nurse should try to get as many details as possible about the case which will help the doctors in their diagnosis. In many instances, the writing down of the details is not insisted on, except for the making out of a case-sheet and temperature chart. The rest is left to the clinical clerk or house-surgeon. When the patient is critically ill, the relatives must be treated with every consideration; to them it may be the most difficult time of their lives, and sympathy must be shown for their grief, anxiety, and distress. When a patient is put on the "danger" list, his relatives must be informed through the central office of the hospital, from which a telegram or police message will be sent. In some cases an "S O S" message may be broadcast by wireless telegraphy.

Lifting and Turning Patients.—One of the first things that must be remembered by the nurse at the beginning of her career is that unless she is of unusually fine physique and strength, it is unwise to attempt to lift a patient single-handed. Lifting is preferably done by two nurses, one at each side of the bed. The way a patient is handled makes a big difference to the ease of lifting. The best way to lift is to carry out the following routine. A nurse stands close to the bed at one side, and her assistant in a similar position on the other. Both look towards the head of the bed. Together they link their proximal arms under the axilla, their free arms being round the lumbar region, with the hands supporting the small of the back. The patient is then told to cross his arms firmly over the sternum and to put his chin as near to the chest as possible, in the middle line. His knees should also be drawn up, so that he avoids by his whole attitude any looseness of limb, and makes his body a compact unit for lifting. He can then be set up as far as he likes in the bed.

If the patient is helpless, a sort of cradle should be made by the nurses. They face each other on either side of the bed, pass the hands below the patient and firmly clasp them at the level of the scapulæ and the pelvis. The patient can then be slowly lifted to any other position. The same principle holds good when the position is changed from the sitting position to the recumbent one.

When a paralysed, unconscious, or otherwise helpless patient has to be moved from his bed, say, to another bed, a pole-stretcher is used. This consists of a canvas sheet, with the long edges made into a hollow hem, forming a channel for two stout poles. The sheet is carefully placed under the patient, who is rolled over on his side for the purpose, then he is rolled back, and when the sheet is adjusted properly underneath him, the

poles are pushed in and the patient is thus easily carried off. In an emergency, the draw-sheet can be used, but a third nurse, or a convalescent patient, must support the head while the patient is being transported.

Details of Turning.—Stand at the side of the bed to which you wish to turn your patient. Loosen the bed-clothes. Stretch out your hands towards him, one passing well over the back at the level of the scapulæ, and the other just over the buttocks,

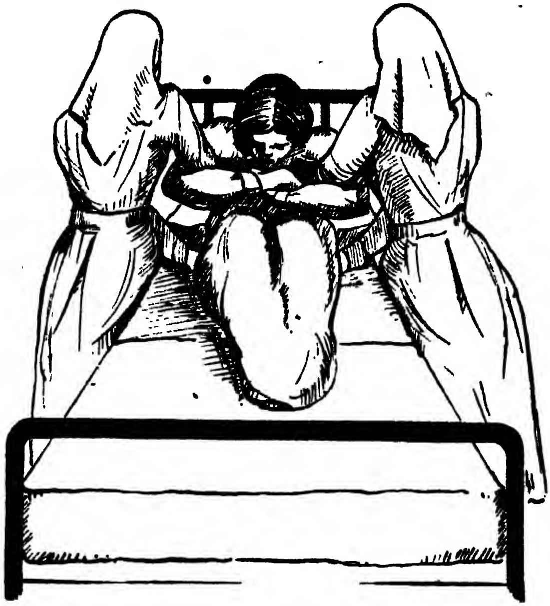


FIG. 31.—METHOD OF LIFTING PATIENT FARTHER UP THE BED.

and with great care and deliberation gently pull the patient towards you.

Bathing.—When the sister or other responsible person has sanctioned the bathing of the patient, he can have his bath in the ordinary bathroom, or if he is too ill, a blanket-bath must be prepared.

1. *In the Bathroom.*—In some cases, the patient has not had a bath for some time, and with a few there is a protesting acquiescence to the ceremony, so that the attendant must see that the cleansing is properly done. This may mean the changing of the water several times. A female patient can be directly supervised by a woman, but male patients are bathed in the presence of a male nurse. Assuming that the bathroom windows have

been closed, the hot-water supply tested, and the towels prepared while the admission formalities were going on, the bath is run half full, some cold water first, and then hot water, being added until the reading on the bath thermometer is 100°–105° F. The practice of putting " disinfectants " in the bath is often a matter of adding a deodorant property only, but a little ammonia is stimulating and pleasant. The attendant should aim at a good superficial cleansing. It is often impossible to get rid of ingrained dirt for several days. The feet and legs, including the toe-nails, require a scrubbing brush and plenty of soap, especially when the water is hard. The arms and hands must have similar care. The next part to be cleaned is the body, which should be immersed and soaked in the water for a few minutes. Particular attention should be paid to the axillæ, groins, and peri-anal areas. The umbilicus may require to be carefully cleaned out with a pair of blunt forceps. Lastly the head demands attention. Liquid soap or alkaline and spirit shampoo may be used, but usually it is best to lather the soap on the hands, and then rub the soap well into the hair until a mass of foam is obtained. Rinse well out after this. When every portion of the body has received satisfactory attention, the patient can be dried with a warm towel; the rubbing should not be too vigorous, but no time should be lost. Females with long hair present difficulties; their hair takes some time to dry, but it can be carefully combed and brushed and when they get back to bed, the hair is spread out on a woolly towel laid over the pillow or the hot-water bottle, while the part of the towel not in use is folded over the hair. The hair is thus sandwiched between two layers of towelling, and quickly dries without causing any danger of lowered temperature. Before the patient is put to bed, the bed is warmed or " aired," as the saying goes, by a hot-water bottle.

2. *The Blanket-bath.*—When a new patient has been bathed in the bathroom, he leaves all his own clothes on a corner bench, and puts on clean hospital bed-clothing, usually a nightshirt and bed-jacket. In the case of helpless or seriously ill patients, the bed-bath is the routine of initial cleansing; the method of disposal of the clothing is also dealt with in a subsequent paragraph. To prepare the bed-bath, see that the nearby windows are all shut, and that non-transparent screens are placed round the bed. If conditions are such that the fully-clothed patient has to be laid on the bed, the following routine should be carried out: Make sure that all utensils are handy in the first place. Two bath-blankets are required: the common pattern is the typical army brown blanket, but an old ordinary blanket will do, or a large bath towel which has become worn. There is necessary also a full-size mackintosh for the bed, and a smaller waterproof sheet (the Army ground-sheet is ideal) for the floor. On the latter is

put a large enamel pail containing very hot water, while an empty pail should also be provided for the soiled water. The nurse must see that soap, face-cloths or sponge, nail-brush, and scissors are ready on the top of the locker. The large bath towel may be left warming over the hot pipes if necessary. A brush and comb may be added to the collection of things on the locker, and if there is any possibility of broken skin or irritation about the folds of the skin, talcum powder and methylated spirit should also be available.

Final Details.—In leaving a patient after bathing, etc., it is advisable to test the hot-water bottle to see that it is not too hot. The patient should have thick bed-socks and there should be a flannel cover on the bottle. Many serious accidents have occurred through the placing of very hot bottles against insensitive feet. Another essential in the case of new arrivals is to ask about the bladder and bowels. The availability of the urinal and the bed-pan should be explained, also the method of summoning the nurse. Special arrangements have to be made for incontinent persons. The test of a capable nurse is a patient who feels the better for his blanket-bath—relaxed but not worn-out with over-exertion; warm, but not overheated.

Clothing which belongs to the patient can, if not " stoved," be returned to his relatives, together with any possessions not required. In some cases, the hospital can store the clothing, etc., and the nurse responsible should see that an inventory is made and the list signed before the clothing is put away.

All new patients must be kept under observation for the first few hours. If they are coughing or spitting, an enamel sputum mug should be put on their locker, with the instructions that sputum must be expectorated into the mug, and the lid quickly closed. The first sample of urine should be kept, as well as the stool, and if vomiting occurs, the vomited material should be retained until the medical officer has seen it.

Special Treatment of Certain Parts

In the following paragraphs, we consider the care of certain important regions, which may demand special attention.

Care of the Back.—The daily routine of washing may be observed in the form of blanket-bathing every morning, the toilet of the hands and face after dinner, and a final washing of the face and hands at night. Every patient has different problems according to the type of his ailment and the stage of his progress. The skin of the folds of the body and of the scalp have already been mentioned as important; liberal powdering of the folds will prevent irritation, while the scalp is treated with the hair. If there is any sign of poor circulation, or of pressure on bone, or of

waterlogging of the skin of the back, especially in the lumbar region, the nurse must be very careful, as this condition, both from the patient's and nurse's point of view, is a heart-breaking and most obstinate defect. The slightest extra strain on the skin may cause a bed-sore; this can usually be prevented by good nursing, but it is sometimes inevitable in very difficult cases. The subject is fully discussed later and at present we are concerned only with the prevention. To make efficient defence against the starting of an ulcer, the nurse must keep her eyes open for the preliminary reddening of the area on which pressure is put. If she carries out the routine skin-hardening, however, there may be no question of bed-sore at all. If the skin of the back is well washed with soap and water twice daily, and afterwards carefully dried and then dusted with talcum powder, there may be complete immunity to bed-sore. Generally some methylated spirit is well rubbed in, or some other strong alcoholic extract, such as eau-de-Cologne, brandy, or whisky if cheaper things are not available. This not only hardens the skin; it stimulates the circulation, and keeps the area well nourished. The alternative is the use of some very soft, oily ointment, possibly containing zinc oxide. By rubbing this into the pressure areas, the skin is made pliable and free. If done twice a day with the palm of the hand in a rotatory motion, the "dangerous areas" can be protected against degeneration. The other methods are those of water-beds and air-beds, both of which are fully dealt with later, and of variation of the posture. Constant pressure is the great danger; therefore the position of the patient should be changed regularly every two hours or so, and thus he is saved from a prolonged irritation of one portion of his back.

Hands and Feet.—Special attention should be paid to the hands and feet, making sure that the nails are cut and trimmed, that all dirt is removed, and that cleanliness of the webs of the feet and of the toe-nails is assured. Corns should be pared. Bed-sores should be prevented on elbows and heels.

Head and Hair.—The treatment of the scalp is allied to the treatment of the hair. The system adopted generally with long-haired women in hospitals is to remove the bed-gown and tightly tuck the bed-clothes round the waist and back. Then fix a thick blanket, used for the purpose, round the shoulders, and pin it in front so that it is like a large shawl. The patient's head should then be placed as near to the edge of the bed as possible. One mackintosh sheet is placed, as a sort of gutter, below the head and leading into a small enamel bath or large basin, set on the floor close to the bed. The hair is then spread out on the surface of the mackintosh. It is advisable also to cover the chair with a waterproof sheet. The small bath is one-third filled with hot water, and the hair is wetted by scooping up a pint at a time

and allowing it to run from the scalp to the bath. If shampoo solution is used, or soap powder, it can then be well massaged into the hair and scalp, until a great mass of white lather is produced, and to complete, the contents of a jug of hot water are poured over the hair to remove all traces of soap and dirt. The waterproof sheeting can now be removed, and the hair is dried as it lies on the shawl-blanket, but sometimes it can be gathered up into a large towel and thoroughly dried. It should then be well combed to remove any tangles, brushed, and made into two plaits.

In some cases (e.g. when patients are lying on their backs with

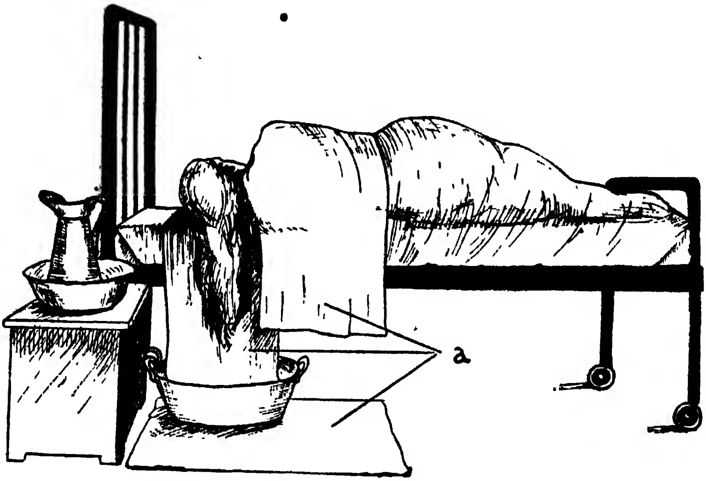


FIG. 32.—WASHING THE HAIR, METHOD 1.

a, Mackintosh sheets.

the legs fixed in splints) the washing has to be done at the head of the bed. There are difficulties, but the task is not so hard if the pillows are taken away, and the top of the mattress folded under itself so that the hair can hang down over the wire mattress through the bar at the top of the bed. Otherwise the routine is the same as above.

A second method, and a very good one, is to pull the hair mattress sufficiently over the foot of the bed, so that a space is left at the top, exposing the wire mattress. Extend the mackintosh covering the pillow so that it also covers the wire mattress. Place the basin containing the water on it.

By this method, the patient's hair can be shampooed as she is placed either in the prone or the upright position. All that is required is extension of the head backwards over the basin.

Treatment when Vermin are Present.—If it is found on admission of a patient that the hair and the scalp are *verminous*, the subsequent treatment depends upon the custom of the hospital. In many cases, both male and female patients have the head cropped as closely to the scalp as possible, the scalp thoroughly shampooed, and vermicidal ointment applied. Whatever may be said to the contrary (and admittedly there are many objections to this from a decorative point of view), the method is the most efficacious from the curative point of view. It ensures the de-

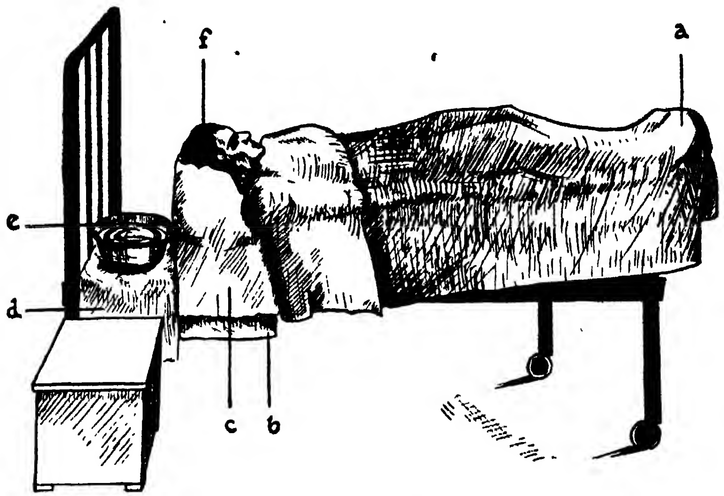


FIG. 33.—WASHING THE HAIR, METHOD 2.

a, Patient's feet extended beyond lower end of bed. *b* and *c*, Mackintosh sheets covering top of mattress, which is folded under itself. *d*, Mackintosh sheet over wire mattress. *e*, Basin foı hair lotion. *f*, Hair preparatory to washing.

struction of the nits, which, as long as they stick to the hairs, are a menace. New hair does not take long to grow on a healthy scalp. This subject is more fully discussed later.

If the hair must be preserved, it should be dealt with by some method of enclosure in a compress. Paraffin oil is the favourite, although it is a " messy " and unpleasant system of treatment. First of all, the head at the edges of the growing hair must be well smeared with vaseline; this prevents the escape of paraffin, which is inflammable, and which for this reason must be carefully shut in. Small bundles of hair are then selected and tied up in squares of lint soaked in paraffin oil, until the whole head is covered. On the top of this is put an enveloping portion of lint covered by a larger square of gutta-percha or mackintosh tissue. A flannel

bandage is applied, firmly fixing the compress, which should be left on for thirty-six hours if it is going to be allowed to do its work properly, but generally it is removed after twenty-four

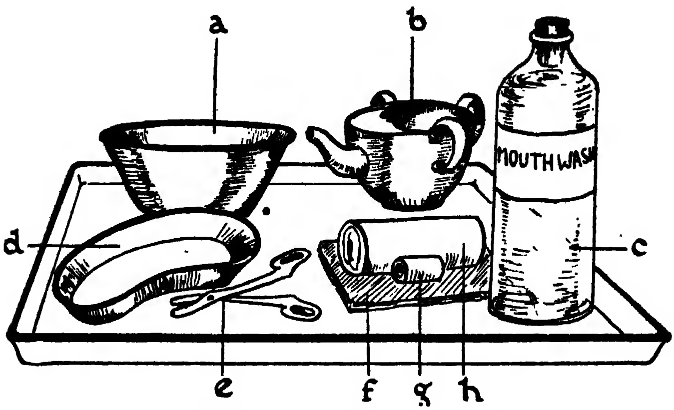


FIG. 34.—TRAY SET OUT FOR TOILET OF THE MOUTH.

a, Enamel basin for sputum. *b*, Feeding-cup for mouth wash. *c*, Solution of mouth wash. *d*, Kidney basin for soiled swabs. *e*, Artery forceps. *f*, Supply of muslin. *g*, Gauze. *h*, Cotton-wool.

FIG. 35.—THE SPARKLET HYGIENATOR FOR SPRAYING GUMS AND TEETH.

(By courtesy of Sparklets, Ltd., London.

hours, when the hair is washed and treated with a tooth-comb.

To make sure that vermin are not allowed to spread, the heads of all patients should be daily inspected, due respect being paid to the personal sensitivity about the subject of lice.

Mouth and Teeth.—The greatest importance rests in the daily cleansing of the mouth and teeth. Especially is this so in patients who are paralysed, who have affections of the mouth, who suffer from fevers like scarlet fever, diphtheria, or pneumonia. In these special cases, it may be the regular duty of a nurse to see that the toilet of the mouth is carried out every four hours or oftener. In long-continued and debilitating fevers, the tongue becomes dry, furred, and brown; *sordes* (a condition of soiling of the teeth owing to the mixture of dry saliva, epithelial debris, germs, and particles of food) collect on the teeth, and the breath is fœtid. It is a wonderful tonic to the patient to have his mouth "done out" frequently. The tongue is dealt with by winding round the handle of a tooth-brush a few strips of gauze soaked in sodium bicarbonate solution, and then using the contrivance as a "squeegee," from the back of the tongue to the tip. The inside of the mouth, edges of the gums, and the surface of the teeth can also be dealt with by pledgets of cotton-wool soaked in sodium bicarbonate, and fixed in the teeth of small artery forceps (a sponge-holder will do as well). The gums may be treated by carbonic-acid gas spray as shown. The teeth may be cleaned with a soft tooth-brush and any of the well-known dentifrices. The mouth should afterwards be well rinsed out with one of the following solutions: sotol, borax and glycerine, lemon and borax, thymol, glycothymoline, listerine, dettolin, or hydrogen peroxide. In many cases, the patient likes to have his mouth rinsed out with copious draughts of ordinary water, which is both cooling and refreshing, especially if his mouth cells are very dry.

FIG. 36.—SPRAYING OF THE TEETH AND GUMS WITH CARBONIC-ACID GAS BY THE "HYGIENATOR" METHOD

(By courtesy of Sparklets, Ltd.)

A serviceable tray may be made up for cases requiring constant

mouth lavage. On it should be kept ready muslin, gauze, solutions for the mouth, artery forceps or sponge-holders, a feeding-cup for holding the mouth-wash, cotton-wool, small

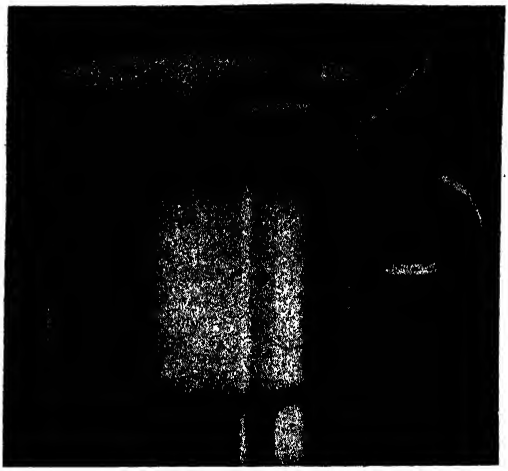


FIG. 37.—STAINLESS STEEL SPUTUM MUG WITH REMOVABLE COVER.

(*By courtesy of Messrs. Willen Bros., London.*)

enamel basin for expectorating into, and a kidney basin for the dirty swabs. The greatest care must be taken to sterilize each instrument and utensil after use.

CHAPTER 4

THE PATIENT'S BED

THE HOSPITAL BED. BED-MAKING. SPECIAL VARIETIES OF BED. OPERATION BEDS. FRACTURE BEDS. PLASTER BEDS. AMPUTATION BEDS. RHEUMATIC BEDS; RENAL BEDS. BEDS FOR HEART CASES. BEDS FOR SPECIAL DRAINAGE. ADJUNCTS TO BEDS. BED-SORES. CAUSES. PROGRESS OF BED-SORES. SYMPTOMS AND SIGNS. TREATMENT. SPECIAL TYPES OF BEDS AND PILLOWS. AIR-BEDS. AIR-PILLOWS AND RINGS. WATER-BEDS AND PILLOWS. HEATING OF BEDS. HOT-WATER BOTTLES.

THE bed is all-important to the patient. In it he is forced to remain for practically twenty-four hours of the day; he is limited by its confines; he is peculiarly susceptible to the slightest changes in its composition; his progress of mind and body depends intimately on the comfort of the place in which he spends his period of treatment. It is essential that the patient should be absolutely free from all possible discomfort; every effort should be made to adjust the bed to suit the person in it.

Bed-making should be carried out on the principles, in order of importance, of *comfort*, *cleanliness*, and *appearance*. While we all strive to keep the ward tidy, we must not be hard on those who are restless in bed and who thus upset the apple cart of uniformity. At one time, the index of a sister's good management was a row of beds evenly spaced and carefully " dressed." Except in very special cases, the bedding was arranged according to one pattern only, and the clothes were tucked in securely as if it were intended to imprison the patient and not to alleviate his condition. Anyone who has spent a few weeks in the atmosphere of such discipline can appreciate how a period in bed in such circumstances becomes almost impossible and how the moral effect of the restriction is bad for recovery.

The Hospital Bed.—The usual hospital bed is 30 inches from the ground, 6 feet long, and 3 feet wide. The best patterns are the simplest. Cast-iron frames with several coats of enamel or paint, and with open ends surmounted by hollow rails, make cleansing and disinfection very easy. A wire mattress is fixed to the top

of the frame, either by straps or by small catches and slots. On the top of the wire mattress is a thick hair mattress, but in some cases, two "biscuits," each 3 feet by 3 feet, are interposed, making the bed firmer, and, to some, more comfortable. If there is no cover provided for the hair mattress when it is used without the underlying biscuits, the wire mattress should be covered with a sheet of hessian. On the top of the hair mattress it is usual to place an old blanket which has shrunk so that it occupies an area of the bed roughly 4 feet by 3 feet—the part on which the main weight of the body is put. In many cases, however, a waterproof sheet becomes necessary, owing to the nature of the illness, and where there is any question of urinary or bowel weakness, or other possible soiling of the mattress, this takes the place of the old blanket.

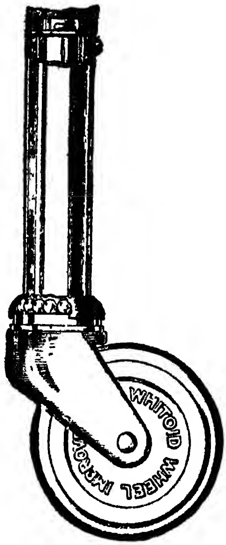


FIG. 38.—BALL-BEARING CASTOR FOR FITTING TO HOSPITAL BEDS (LUMEX PATTERN).

(By courtesy of Messrs. Willen Bros., London.)

The foundation of the bed having been built, the bed-clothes proper must be put on. First comes the bottom sheet, which should be laid on with its edges straight, and the same amount overlapping at the top as at the bottom. It cannot be too strongly impressed on the nurse how essential it is that this sheet should be drawn tightly, and firmly tucked in below the mattress all round. The slightest crease may cause all kinds of discomfort and probably a bed-sore. It is customary in cases of acute illness to add a *draw-sheet*, which consists of a piece of old soft sheeting, about 30 inches wide, and fixed over the bottom sheet at the part of the bed upon which lies the part of the patient's body extending from the shoulders to the knees. It is a method

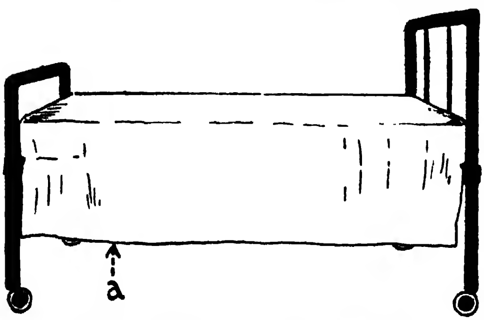


FIG. 39.—PREPARING THE BOTTOM SHEET. (First stage.)

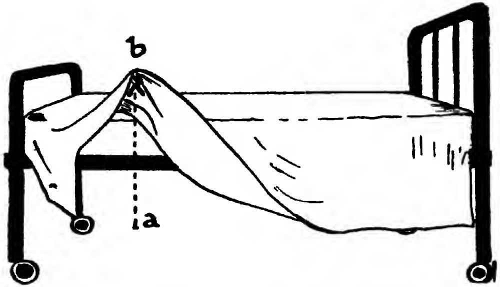


FIG. 40.—PREPARING THE BOTTOM SHEET.
(Second stage.)

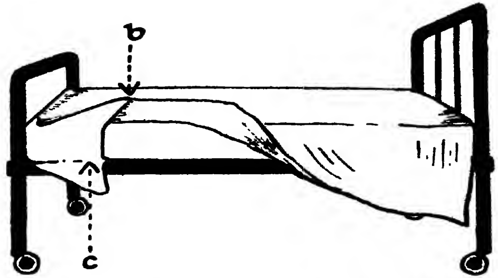


FIG. 41.—PREPARING THE BOTTOM SHEET.
(Third stage.)

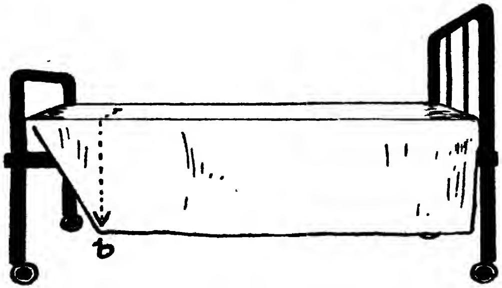


FIG. 42.—PREPARING THE BOTTOM SHEET.
(Fourth stage.)

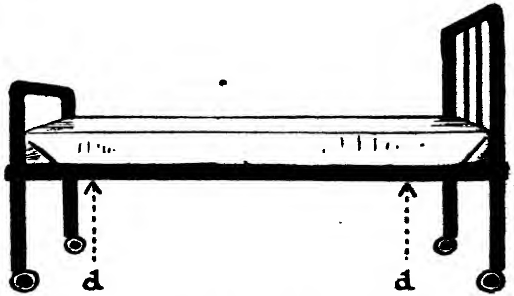


FIG. 43.—PREPARING THE BOTTOM SHEET.
(Completion.)

of ensuring that the portion on which the patient lies is perfectly smooth, as it is a simple matter to pull each end of the draw-sheet at intervals, and to tuck it below the mattress.

The top bed-clothes consist of a sheet and several blankets with a counterpane. For those who do not object to it, and who may be susceptible to cold, a thin, narrow blanket may be put on next to the patient. The fixing of the top bed-clothes is a very important matter, as stated above. When patients lie on their backs, their toes point upwards, and it is most uncomfortable to have the top bed-clothes tightly drawn over them. Another point is that although the sheet and blankets should cover the chest as far up as possible, they should not be such that the patient is hemmed in. He must have freedom of movement. Naturally, however, the clothes should be arranged so that the maximum heat is retained. Too much weight of top bed-clothes should be avoided. Every nursing school has its own way of finishing off the bed, so as to make it neat. In most hospitals, the blankets are tucked in with the sheet below the mattress at the bottom, while by making an "envelope" fold, the clothes hang down neatly at the sides of the bed. In some instances, the sides of the sheet and blankets are tucked below the mattress as well. At the top of the bed, two or three pillows are put, or a firm bolster and a soft pillow, which act as a support and pad for the head, neck, and shoulders. Generally speaking, the sheet should be folded back over the blankets at the lower edge of the bolster, allowing 18–24 inches of an overlap. When a counterpane is in use, it is laid over the bed, tucked in at the bottom, folded back with an overlap like the top sheet, and the sides are allowed to hang down, the bottom being made neat by envelope tuck. Sometimes the counterpane extends right over the pillows, and thus covers the entire bed.

All the above directions are subject to modifications, but they serve as a standard pattern. During the night, patients, in sleeping, adopt the postures they instinctively know to be the best for sleep, and they should never be prevented from doing this. If they want to pull the bed-clothes over their shoulders, they should be allowed to do so. Restless patients who throw off the clothes should naturally have their beds adjusted, but they need not be aroused from their sleep.

Bed-making.—The daily routine of bed-making generally consists of a complete re-making in the morning, and a general "tidy-up" at bedtime. In the morning, when the beds are stripped, the nurses should work in pairs. The most convenient way to make the bed is to put the bedside chair in the passage-way at the foot of the bed, then the counterpane is folded neatly and put on the seat. In succession follow the blankets and

sheets, each being folded lengthways so as to reduce the length to one-third, the top flap being covered by the bottom flap. These can then be placed neatly over the back of the chair, and arranged so that none of the bed-clothes touch the floor. Draw-sheets and the bottom sheet usually contain debris and crumbs, and therefore they must be shaken; the waterproof sheet must be laid over the chair unfolded. If the patient can be placed for a moment on another chair or on the next bed, the mattress should be turned, shaken up, and quickly set in

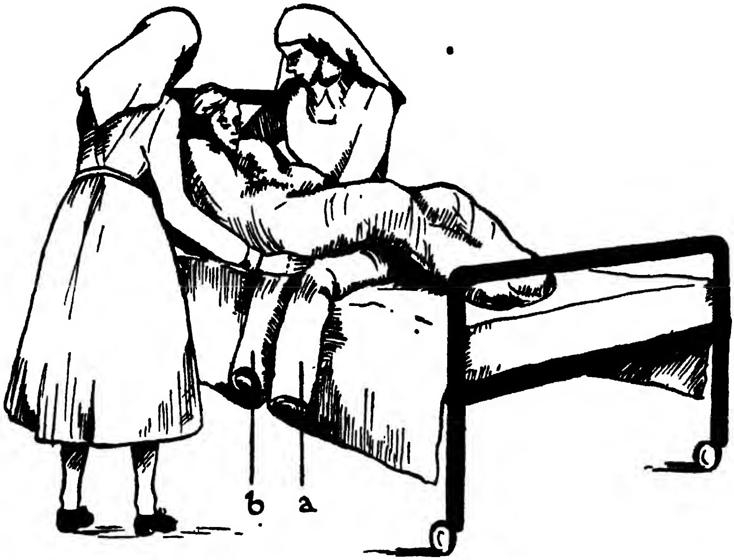


FIG. 44.—CHANGING BED-CLOTHES.

First method. *a*, Old sheet being rolled down towards feet. *b*, New sheet following.

position. Now and then the wire mattress requires to be brushed, in which case the hair mattress is rolled first to the top and secondly to the bottom while the lower and the upper halves respectively of the wire are being cleaned. After the mattress has been turned, the rest of the bottom clothes are laid on, the patient put back to bed, and the clothes quickly spread over him in the approved fashion.

When the Patient cannot leave the Bed.—This condition calls for somewhat different treatment. The best that can be done is a changing of the bottom sheet, with adjustment of the mackintosh and draw-sheet. There are two ways of doing this:

(*a*) Have all the clean linen handy, properly aired and

warm. The nurses prepare the new sheet by making it into a roll of cloth on its long axis. Make sure that the windows are closed. One nurse stands at one side of the bed and the other at the other side. Take away pillows and top coverings. Loosen the bottom sheet, draw-sheet, and mackintosh. The assisting nurse then helps the patient to rise on his elbows, and as he does so, the old sheet is rolled down, while the new sheet is rolled into its place, the whole direction being from the top of the bed

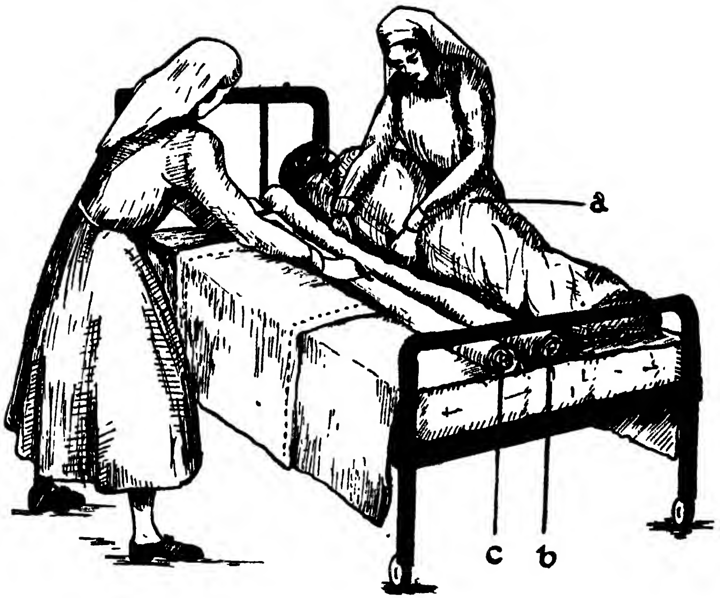


FIG. 45.—CHANGING BED-CLOTHES.

Second method. *a*, Patient rolled over on her side as far as possible. *b*, Soiled bed-clothes rolled up. *c*, New bed-clothes ready to be rolled under patient's body.

to the bottom. The draw-sheet presents no difficulties, as it is only about 30 inches wide. If a mackintosh is used, it can be rolled on the outside of the bottom sheet and it falls into position with the sheet. The disadvantage of this method is that it puts too much strain on certain patients. A much more popular method is:

(*b*) The side-to-side method. In this the sheet which is to be put on, together with a new draw-sheet inside it at the proper position, and the mackintosh outside it, is rolled lengthways on its short axis. The assistant gently draws the patient, covered by a short blanket, to the extreme edge of the bed. Two-thirds

of the bed are thus left vacant, and the under-sheet, draw-sheet, and mackintosh are rolled towards the patient. Following this stage, the new sheet is rolled out to two-thirds of its width, and the remainder of the roll lies close to the patient's back. The assistant then lets the patient roll over on his back to the clean sheet, and immediately afterwards pulls away the soiled clothes and rolls out the remaining third to the edge of the bed. The patient is then lifted to the centre of the bed, which is adjusted in the usual way. Occasionally the draw-sheet is fixed separately, as it is an easy matter. In cases in which the mackintosh sheet is not removed, it can be sponged and quickly dried, smoothed and adjusted, and the mattress can also be beaten up, the whole procedure occupying about a minute. With skilled nurses, the complete change should be done in less than five minutes.

In all these procedures, the nurse's last act must be that of ensuring that the bottom bed-clothes are without a wrinkle, and that the patient is placed comfortably over the middle of the draw-sheet.

Special Varieties of Bed

In various types of illness, e.g. accident, post-operative conditions, etc., a special form of bed must be devised. The following are the chief varieties:

Operation Beds.—When a patient is in the operating theatre, the bed he is to occupy on his return must be prepared. It is usual to strip the bed of its top coverings; the bottom coverings are examined to make sure that the sheets and mackintoshes are perfectly smooth. The pillows are removed, except for special cases, and in their place is put a tightly-drawn mackintosh covered by an old bath towel. On the locker is a sickness basin, with squares of cloth for swabbing out the mouth, and a small sickness towel. Three hot-water bottles are put on the bed, and they are covered by a blanket doubled from side to side. Three methods of preparation are then possible. In the first, the top clothes are fixed in all along one side, and half-way along the bottom. When the patient arrives, it is a simple matter to take out the bottles, cover him with the hot blanket, and then tuck in the rest of the clothes. In the second way, the clothes are left loose except at the bottom. When the patient returns, the whole of the top layer is rolled down, and the above procedure then carried out. The third method consists of putting the bottles all together in the centre of the bed. The top clothes are arranged in the same way as for an ordinary bed, but instead of being tucked in under the mattress, the sides are brought up as flaps over the middle, the bottom third being folded on top

of them and lastly the top third over the bottom third. A blanket is heated over the hot pipes, or at the fire. It is then easy to put the patient on the bed, to remove the pile of bed-clothes momentarily, to cover him with the hot blanket, and to unfold the coverings in the reverse order to that in which they were made up.

In all three methods, the hot-water bottles should be packed

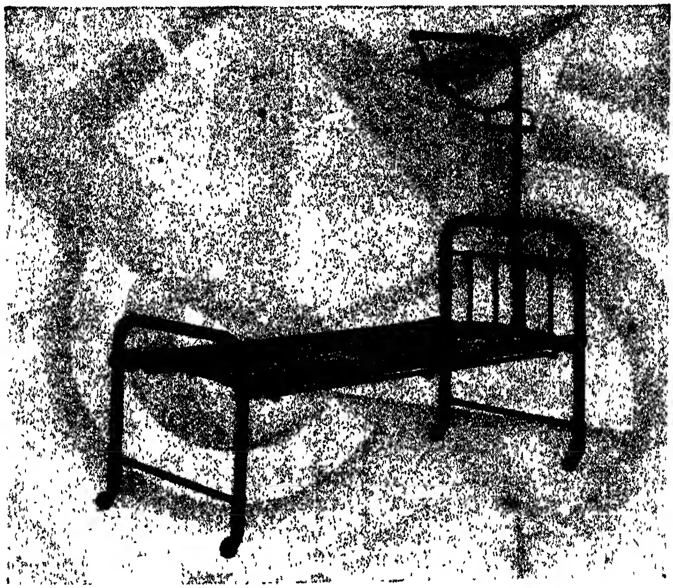


FIG. 46.—FRACTURE BED.

This bed is reinforced by steel brackets, and below the framework, so that, as shown above, fracture boards can be inserted without disturbing the patient.

(By courtesy of Messrs. Willen Bros., London.)

carefully round the patient, the usual precautions being taken so that he is in no danger of a burn.

Fracture Beds.—In these, wooden fracture boards are put below the hair mattress to prevent any sagging. A fracture bed is used in amputations, plaster cases, and for any injuries which demand a firm basis. In certain circumstances, the biscuit method of mattressing is used, so that when the patient wishes to pass urine or to defæcate, the portions can be moved apart, and the bed-pan put in their place; this saves any jolting of the patient. For cases of fracture of the spine, and for incontinence and senile cases, a very fine arrangement can be used. The fracture board has a circular hole in it, about 9 inches in

diameter. A straw mattress, also constructed on the same plan, is placed over it, and on the top a water bed, furnished with a small funnelled aperture passing through its middle and ending in a rubber pipe. This pipe passes through the hole in the mattress, and in the board, and is received into a bucket. By this method, the patient can be kept reasonably dry. The buttocks lie over the circular aperture, and may be padded by an air-ring.

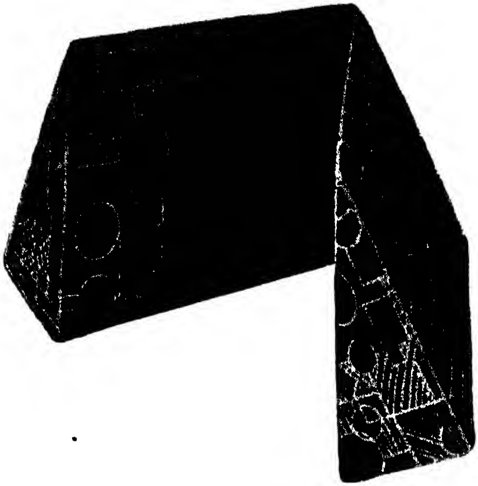


FIG. 47.—ADJUSTABLE BED CUSHION (DUNLOPILLO).
(By courtesy of Messrs. John Bell & Croyden, London.)

Plaster Beds.—After a limb has been put up in plaster, the plaster may take some time to dry, and while it lies on a folded sheet it may require the constant application of hot-water bottles until hard. Another method of dealing with such cases is the suspension of the limb from a wire cradle or cage over which the bed-clothes can be placed. This type of cage is very useful in many cases of injury or illness, where the pressure of the bed-clothes cannot be tolerated.

FIG. 48.—DUNLOPILLO ADJUSTABLE CUSHION USED AS BACK-REST.
(By courtesy of Messrs. John Bell & Croyden, London.)

Amputation Beds.—If, say, the thigh has been amputated through the middle, the stump should be set on a pillow so that the end is free of the under bed-clothes. A cage is placed

Fig. 49.—Fowler's Position (extreme degree).

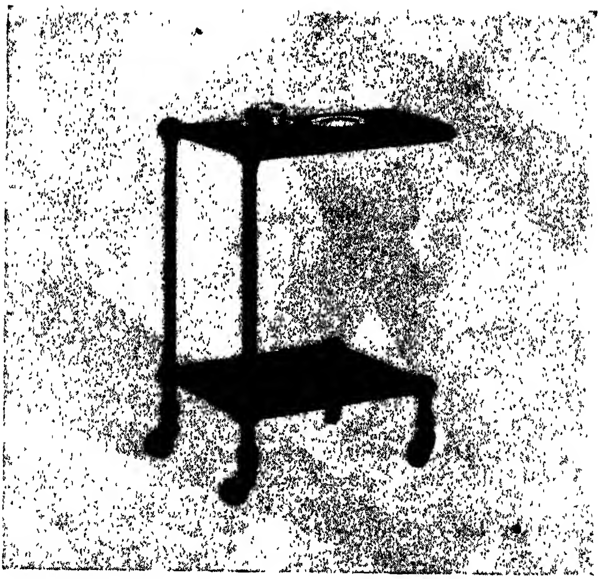


Fig. 50.—Modern Form of Bed-table on Ball-bearing Castors.

(By courtesy of Messrs. Willen Bros., London.)

over the stump, which is left exposed with the rest of the bedclothes round it. The upper part of the thigh can be rolled up in a blanket. The dressings on the end of the stump are thus easily visible, and can be kept under constant supervision.

FIG. 51.—DUNLOPILLO ADJUSTABLE CUSHION USED AS A BOLSTER.

(By courtesy of Messrs. John Bell & Croyden, London.)

Rheumatic Beds; Renal Beds.—For acute rheumatism and acute nephritis (inflammation of the kidney) the beds are very similar. Owing to the great amount of perspiration, it is necessary to retain as much heat as possible and to absorb the moisture. Blankets are therefore put below and above the patient, and exchanged for dry ones when necessary. One pillow is best, as it allows the patient to lie in a closer pack.

FIG. 52.—DUNLOPILLO ADJUSTABLE CUSHION USED AS HEAD-REST.

(By courtesy of Messrs. John Bell & Croyden, London.)

Beds for Heart Cases.— Patients with affected hearts are always difficult to nurse. In the beginning, the inflammation of the lining of the heart is so acute that the patient must have absolute rest on his back, and therefore pillows are often dispensed with. In advanced heart disease, the back-pressure on the lungs is so great that there is difficulty in breathing, a condition called *dyspnœa*. The patient becomes very restless, and requires constant attention because he seeks a new position of possible greater comfort every few minutes. He should be put into a

half-sitting posture, with stiff pillows at his back, or better, a bed-rest. Some patients obtain relief by letting their heads fall forward on a pillow, and in this position only can they get any sleep. If a bed-table is covered with a small pillow, it forms a very satisfactory rest. The nursing in advanced cases with great swellings due to dropsy is very hard work; some patients end their days propped up in arm-chairs, as they cannot lie in bed.

Beds for Special Drainage.—After operation for abscess of the chest (empyæma), acute sepsis of the abdomen, and any condition which requires drainage towards the lower part of the body, the patient is best maintained in a position nearly perpendicular. This is called *Fowler's position.* There are numerous special contrivances for this, but in general, the bed-rest is used almost perpendicularly, while the legs are supported behind the knees by a bolster commonly known as a "donkey." The edges of this bolster must be firmly fixed to the top of the bed. On no account should it be allowed to slip.

FIG. 53.—DUNLOPILLO ADJUSTABLE CUSHION USED AS LEG-REST.

(By courtesy of Messrs. John Bell & Croyden, London.)

Adjuncts to Beds.—Air-rings, air-cushions, air-beds, and water-beds are all special methods of giving support while causing the least pressure, and are much employed. These are discussed below. In addition to these, other helpful comforts are special bedside tables, reading tables, foot-rests, and the cradles or cages already mentioned. In an emergency, a foot-rest can be improvised from a three-legged stool or a hard pillow (this is often used in midwifery), while a bed-rest can be extemporized out of a kitchen or deck-chair.

Bed-sores

Sometimes a bed-sore occurs despite the greatest care and attention on the part of the nurse. While this condition can be prevented in the majority of cases, it does not follow that the nurse

should be blamed for carelessness when it does occur; often circumstances are such that a bed-sore is produced on account of difficulties associated with the patient's environment or with the disease from which he is suffering. As a general rule, however, every nurse, provided she has the facilities for efficient nursing, should make a special point of preventing bed-sores. This may involve the use of water-beds, water-pillows, air-pillows, and many other appliances devised to take the pressure off the skin. These are all described below; in addition, the subject of bed-heating is conveniently considered.

When a bed-sore breaks out, it is a complication which adds a further load to a case already burdened with difficulties. The nurse's task is increased tenfold; the condition means almost constant work, and often the most skilled treatment fails to heal the lesion. The difficulties are most marked in out-of-the-way places, where the usual hospital appliances and facilities are not available; as a general rule, the most trying bed-sores occur in private practice, where conditions of financial stringency prohibit the obtaining of many of the usual adjuncts to treatment.

Causes.—These can be divided into general causes and local causes.

General causes are those associated with old age, with general debility, with chronic heart or kidney disease, with excessive fat, with advanced emaciation, and with many nervous diseases. An old person usually suffers from poor circulation, and is not able to change his position in bed; therefore he tends to keep the pressure on one spot. Weak persons, e.g. after typhoid fever or peritonitis, are in a similar category. Those with heart and kidney complaints suffer from waterlogging of the tissues with fluid, and the skin is soft and easily broken down; added to this there is frequently the irritation of certain parts of the skin by incontinence of urine. People who are too fat are also prone to develop a boggy condition of the skin and underlying tissues; on the other hand, thin people have little or no fleshy or fatty pads on their bony prominences, and so the skin is worn through. In nervous diseases, usually accompanied by paralysis, the sensation is lost, and the general nutrition of the part is affected. This results in a characteristic abrasion, called *trophic sore*. In certain types of paralysis it is almost impossible to avoid this variety of bed-sore, the occurrence of which makes the nursing very difficult, as most mental nurses are fully aware.

Local causes include all conditions in which the local blood supply to the part is deficient, this being the exciting cause of all bed-sores. The occipital part of the head, the shoulders, the elbows, the rounded knobs marking the line of the spine on the back, the sacrum, the spines of the ilium, the great trochanters,

and the heels are the commonest sites. Probably the heels and the sacrum suffer most in cases encountered in general practice.

In addition to the above local causes, however, there is a class which comprises the bed-sores resulting from irritation or rubbing of a susceptible part. It is well known that those who are confined to bed for any length of time, and especially mental patients, become restless and irritable. The frequent rubbing of the elbows on the sheet, or the rubbing of the ankles against each other, or the rubbing of folds of the skin made unbearably itchy by sweat or urine (e.g. the folds of the buttocks), ultimately sets up redness, then inflammation, accompanied by irritation, smarting, and excessive tenderness, and in the end, ulceration. In the pressure sore there is not so much pain; redness may precede the breaking of the skin surface, but the most characteristic feature is the soft, pulpy appearance of the skin, which looks like lard covered by a thin membrane.

Progress of Bed-sores.—In a very short time after the abrasion has occurred, the skin may begin to slough, indicating that there is local death of the tissues, which are cast off. A mild form of circumscribed gangrene is presented. The rate of development of the bed-sore depends upon many contributory factors. For instance, a patient who is allowed to remain lying on bed-clothes soaked with urine, or who is so situated that the toilet of the body can be carried out only at infrequent intervals, is in the ideal environment for further stagnation of the circulation, and his bed-sore advances rapidly. Moist heat, wrinkles in the sheets or clothing, crumbs allowed to lie under the patient's back, careless removal of the bed-pan, the pressure of appliances, and other apparently trivial agents are all causes contributory to the development of the condition.

Symptoms and Signs.—To begin with, the patient may complain of a slight irritation in the affected part, but the observant nurse will always, in her routine examination, anticipate the appearance of the blush on the skin, which is the sure sign of weakened circulation in a part. If the bed-sore is allowed to develop, the irritation will become a real difficulty to the patient. The burning heat is much the same as the pain of neuritis. The patient may, or may not, rub the skin. If he does, it hastens the abrasion of the part, and ere long a small circular ulcer is seen, the circumference of which rapidly increases. In those who have nervous diseases of the spinal cord, the absence of sensory impulses from the part affected may delude the patient (and often the nurse too) into the belief that all is well. Let the efficient nurse keep in mind, therefore, that *signs* and not *symptoms* are of chief importance to her. She should actually take it for granted that in paralysed patients a bed-sore will threaten,

and she should be ready, on the appearance of the faintest blush, to apply padded rings of cotton-wool.

The bed-sore which has gone beyond control is a very unsavoury sight. Deep ulcers, the size of a crown piece, with evil-smelling sloughs at their base, and with unhealthy edges surrounded by angry-looking skin tissue, give the impression of disease of a very callous type. In very severe conditions, the underlying bone may be exposed.

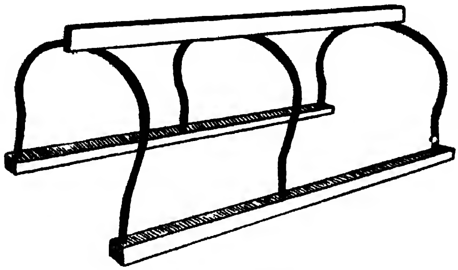


FIG. 54.—WIRE CAGE.

Treatment. — In the established bed-sore, a state of affairs exists which demands the co-operation of the doctor; therefore the slightest break in the skin should be reported without delay, so that appropriate measures may be taken to apply the proper treatment. There are various remedies. Usually the first dressings aim at removal of all dead tissues and other sloughing matter. This can be accomplished by cutting pieces of boracic lint exactly the shape of the ulcer and making a moist dressing by soaking the lint in boiling water, and when cooled applying it to the sore with a gutta-percha tissue cover. Other weak antiseptics may be used, incorporated in fine gauze. Monsol solution is soothing and yet very powerful, and acts very satisfactorily.

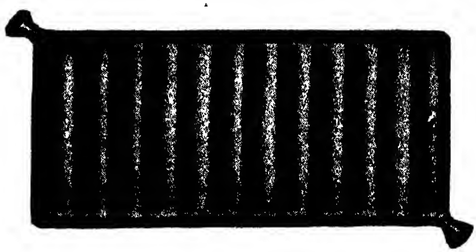


FIG. 55. COMBINED AIR- AND WATER-BED, REEDED TO ENSURE CONTROL.

(By courtesy of Messrs. Willen Bros., London.)

Once the ulcer is clean, some stimulating lotion must be used to help the healing process. Ointment of zinc oxide, alone or combined with sphagnol ointment, ichthyol, tannic acid, magnesium sulphate, zinc sulphate, or gauze incorporated with bismuth are all efficient. But the most important thing to maintain is reduced pressure on the affected part, and the utmost care must be taken to ensure that all the factors productive of the

condition are eliminated. The use of beds specially constructed as described below, the addition of air-pillows, rings, cushions, etc., and the efficient padding of a wide area round the sore will hasten recovery. A very good pad can be made by taking several thin squares of cotton-wool, "fluffing" each one out, so that it is full of air, and laying one layer over another in a succession of pads. The cushion so formed is fixed at the edges either with wound varnish or with strips of adhesive plaster, and forms a sound pad which takes all the pressure from the ulcer. In moving patients with bad bed-sores, and especially in providing them with bed-pans and urinals, the greatest care must be taken that the affected area is not aggravated by the procedure. Bed-sore cases demand all the patience, ingenuity, and attention of the nurse in charge.

Special Types of Beds and Pillows

Air-beds.—Massive rubber bags partially filled with air, or divided up into transverse tubes, each filled with air, are the best-known forms of air-bed, which is in modern form quite as satisfactory as the water-bed. In the tubular type of air-bed it is possible to arrange the air in each compartment according to the needs of the case; thus, to a certain extent, this form is handy as a mould for the body as well as a support, and it allows for careful and accurate adjustment. A special pump usually is provided for all air-beds and pillows. Success depends upon the introduction of just the right amount of air—not too much to make the patient roll off the bed, and not too little to allow him to sink down in the middle and expel all the air to the edges.

Special air-beds are now available in air-celled rubber with air-compartments as illustrated. These are in all respects to be recommended.

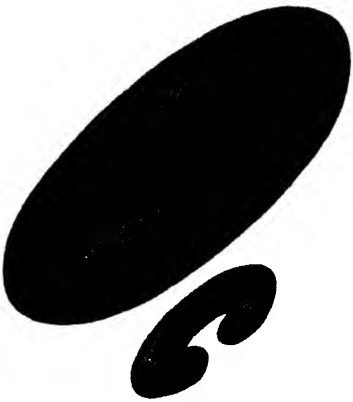


FIG. 56.—REVERSIBLE RING CUSHION (DUNLOPILLO).

(By courtesy of the Dunlop Rubber Co., Ltd.)

Air-pillows and Rings.—We are all familiar with the common types of air-pillow and air-ring. These are of great use, as they are smaller than the air- or water-beds, and they can be moved easily, and fixed according to the special circumstances of the case. They are used for

the head and for the buttocks, the ring pillow being frequently employed to take the strain off the sacrum in those who are sitting up in bed or who are in the semi-recumbent position. Again must be mentioned the usefulness of the modern air-celled rubber appliances which make very efficient head- and neck-rests as well as supplying the other needs referred to above.

Fig. 57.—Non-reversible Ring Cushion (Dunlopillo).

(By courtesy of the Dunlop Rubber Co., Ltd.)

In filling all air-containing appliances, nurses should remember that they should never commit the outrage against asepsis by blowing up the bag with their own breath; on all occasions the pump should be used. When not in use, all such appliances should be left dry, and hung up (not folded) with enough air inside to keep the inner surfaces from touching, and in a dark cupboard away from the light, which has a deleterious effect on rubber.

Water-beds and Pillows.—Water-beds are very commonly used; they are heavier and more unwieldy than air-beds, and must be safely fixed on the bed. In most cases the base of the bed must be strengthened with boards similar to those used for spinal fracture cases. When a water-bed is ordered, the following should be the order of the bed from the wire mattress upwards: Wire mattress; fracture boards; hair mattress; mattress cover; mackintosh; water-bed; blanket well fixed over the water-bed by tucking in the sides carefully; waterproof sheet; bottom sheet; draw-sheet. The rest of the bed is as usual.

Fig. 58.—Dunlopillo Horseshoe Cushion.

(By courtesy of the Dunlop Rubber Co., Ltd.)

Before putting a patient on a water-bed, see that it is of the proper size, that it does not leak, and that it contains the right amount of water, so that the patient is comfortably suspended. The most practical way to install a water-bed is to test its freedom from small holes or other damage, and then to place it in position on the bed. There is a nozzle at one corner. See that this is freely accessible at the *foot* of the bed. Have several jugs of water at about 80° F. by the bed. Carefully pour in the water, using a funnel (some beds have rubber funnels fixed). There are various ways of testing the efficiency of the bed. Some press firmly with both hands, and make sure that they cannot touch the underlying hair mattress; others use the unofficial method of employing the healthy human probationer nurse as a "dummy" to register first-hand her pronouncements as to the luxury of the couch. A well-trained nurse should rarely have to disturb the patient by adding more water or by taking some away after he is in bed. It is well to make sure that the air is excluded before screwing the nozzle tight.

As with air-beds, water-beds should be stored in a dark place. It should be ascertained that the rubber inside is clean. Most authorities recommend that a little air be left in water-beds to keep the internal surfaces apart, but in some cases enough water is allowed to remain in order to prevent the lining becoming adherent. All oils or greasy preparations should be avoided, but talcum powder can be used with advantage in dry water-beds.

FIG. 59.—ELECTRICALLY HEATED PAD, USEFUL FOR MANY FORMS OF RHEUMATISM, AS WELL AS FOR GENERAL COMFORT OF THE PATIENT.

(By courtesy of Thermega, Ltd., London.)

Heating of Beds

The days of electrical devices for the heating of beds are with us, and it cannot be long before electrically heated blankets or cushions are universally employed. Meanwhile, if steady heat is required, a cage can be introduced as described elsewhere, and the heat from an electric bulb used. Apart from these special methods, however, the old-established and well-

tried hot-water bottle is the chief means of keeping a patient warm in bed.

Hot-water Bottles.—The earliest type is the *earthenware* bottle. Of similar shape and size is the *aluminium* or *tin* bottle. These stand boiling water well, and retain their heat for a

FIG. 60.—PREPARING THE BED FOR THE PATIENT IN THE MODERN WAY.

Both Thermega pillow and Thermega blanket are heated from a two-way switch at the bed-side.

(By courtesy of Thermega, Ltd., London.)

lengthy period, but they are hard and clumsy, and even dangerous from the point of view of cracks, breakages, and burns inflicted on the patient, so the hot-water bag of *rubber* is the most popular. One of the most elementary accomplishments of the nurse is the correct method of filling a rubber hot-water bag, yet many seem to think that all that is necessary is to pour in some boiling water, screw the tap round a few turns, and put

the bag at the patient's feet. This is quite wrong, of course, as it leads to all kinds of accidents from sudden leakage, bursting, or burning of the skin by contact, all of which must be avoided.

The correct way to provide for heat in the bed is to boil a kettleful of water and leave it to cool for a little. If boiling water is regularly poured into a rubber container, the rubber will very soon perish. First, about half a pint of water should be run into the bag; this will heat up the rubber itself. Pour this quantity out, and then fill the bag about two-thirds. Press the upper part of the bag so that all the steam is expelled, and then screw up the nozzle tightly, making sure that the washer, if present, is satisfactory, or that there is no possibility of the screw working loose. It may be found that the bag bulges out after a few seconds, in which case unscrew the nozzle and let out the vapour. Dry the bottle carefully, and cover with a flannel or other insulating bag which has been kept warm at the fire. See that it is not too hot for the patient.

In special cases in which the patient is helpless owing to unconsciousness, paralysis, the effects of an anæsthetic, or extreme illness, it is essential to see that the bag does its work without detriment to the patient. Zeal for the patient's welfare may sometimes result tragically if the heat causes severe blistering at the soles of the feet or at other points in too close contact with the source of heat. For this reason, special care should be taken to ensure that in cases of severe illness, the bag is applied on the outside of the blanket which is spread over the patient. If a burn occurs as a result of want of care on the nurse's part, it is a black mark against her for the rest of her career; indeed, in some cases it has led to legal action being taken. The greatest pains should always be taken to prevent all possibility of burns by hot-water bags.

CHAPTER 5

ROUTINE PROCEDURES OF NURSING

INFORMATION: HOW TO COLLECT IT. OBSERVATION OF CASES. THE PATIENT'S APPEARANCE. THE CONDUCT OF THE PATIENT. THE IMPORTANCE OF PAIN. SPECIAL POINTS. KEEPING OF RECORDS. THE TEMPERATURE. THE CLINICAL THERMOMETER. THE FAHRENHEIT SCALE. HOW TO TAKE THE TEMPERATURE. TEMPERATURE OF THE MOUTH. TEMPERATURE OF THE AXILLA AND OF THE GROIN. TEMPERATURE OF THE RECTUM. THE NORMAL TEMPERATURE. ABNORMAL TEMPERATURE. TYPES OF FEVER. THE FEBRILE STATES SUMMARIZED. RIGORS. TERMINATION OF FEVER. TIMES AT WHICH TEMPERATURE SHOULD BE TAKEN. THE PULSE. HOW TO ESTIMATE THE PULSE. PULSE-RATE. VOLUME. TENSION. RHYTHM. OTHER TYPES OF PULSE. RESPIRATION. RATE OF BREATHING. VARIETIES OF BREATHING. DYSPNŒA. ORTHOPNŒA. STRIDOR. STERTOR. ACCOMPANIMENTS. APNŒA. CHEYNE-STOKES BREATHING. CYANOSIS. COUGH AND SPIT.

An accurate report from the nurse constantly in touch with the patient is essential to the best results in disease. The visiting physician may spend only a few minutes actually examining the patient each day, but he takes away with him in the pigeon-holes of his mind all the records added to the case since his last visit, and he is dependent upon the nurse for facts and not for opinions.

When the doctor arrives, therefore, whether it be in the ward or in the sick-room of private practice, the nurse should have, as already stated, all the important occurrences of the previous twenty-four hours marshalled in her brain, and in addition to having ready the detailed and written statement of the various essential records, she ought to be able to answer any questions about the conduct or appearance of her patient which may add some constructive evidence to the case. It is a waste of time to make observations in an abstract and indefinite way. What the doctor wants is not the *opinion* of the nurse, but a clear-cut, exact statement of the *facts* observed by her during her period of duty,

and these facts should be neither embellished nor belittled by language stimulated by the imagination of the person making the report.

Information: How to Collect It.—When a nurse is in charge of a patient, she depends upon two things for her information. First she has the expressions of the patient (*symptoms*); secondly she makes use of her powers of observation and discovers facts for herself (*signs*). Both are of great value, but all symptoms should be substantiated by signs, and the nurse should use her powers of examination and deduction in the quest of abnormal demonstrations in the various systems of her patient. For instance, a patient may complain of pains shooting down from the small of the back to the bladder; this may be a symptom of many ailments, but when the nurse notes that in addition there is frequency of passing urine, coupled with a smoky or reddish appearance of the urine, she is bringing the diagnosis to a much more accurate basis which will probably become definitely one of small stone in the kidney. Aware of the normal from her knowledge of anatomy, physiology, and hygiene, the nurse must therefore be ready to discover any deviations from it, however small they may be; this is the whole art of *diagnosis*.

Observation of Cases

It is very difficult to know how to begin the examination of a sick person. Apart from the complaints of the patient, the excited and worrying attitude of most relatives, the alarming conditions of the disease, and the feeling of timidity at approaching something very complex, there are confusing factors and intermingled expressions of abnormality which may spread their confusion into the mind of the inexperienced nurse. If she remembers, however, to go about her observation in a systematic way, taking each area, each system, and each organ in turn, she will ultimately find herself supplied with a category of facts, which, when they are taken together, may be built up into a structure representing the particular disease from which her patient is suffering. Below is given a list of the main things to be noted in all diseases. When a study is made of the individual diseases later on, greater elaboration may be made.

The Patient's Appearance.—This question must be answered as clearly and concisely as possible; the things that are primarily impressive to the nurse's mind are the things which count most valuably. The face is the chief register of abnormal sensations. From its expression we can deduce pain, sickness, depression, exaltation, weakness, or distress. The lines of the mouth, the state of the eyes, the complexion, the colour of the lips, the condition of the skin, each in turn must be weighed up

and registered at proper valuation. The combination of facial expressions fits into the picture of the associated disease; thus the wide-eyed, highly flushed, and restless head of acute lung trouble can be distinguished from the narrow-eyed, pale-faced, and stiffly held head and the pursed lips usually indicative of abdominal inflammation. Again, the ivory pallor of anæmia, the dusky white of wasting disease, the yellow of jaundice, and the deep purple of congestive chest troubles are all important signs which lead us to the real seat of the disease at which the remedy must be applied. There is no limit to the information an observant nurse can provide if she keeps her eyes open, and the more she can tell the doctor the better for the patient. For instance, a transient jaundice may appear in the evening, or a hectic flush on the cheek at night. The doctor may not be on the spot to observe these himself, therefore he trusts to the nurse to tell him exactly how the change comes on and how it passes off. In these matters, the nurse may indeed provide the key to the whole situation.

The Conduct of the Patient.—Another very important aspect of observation is the attitude of the patient. A casual visitor to a ward sees patients lying in various positions presumably because each invalid selects the posture of his body and limbs according to the comfort and freedom from pain produced by adopting it. But in twenty-four hours the position may change markedly; it is an unfortunate, but nevertheless undeniable, fact that the patient makes a supreme effort in the majority of cases to appear at his best when the doctor is making his call. Hundreds of times the nurse has to tell the doctor that he is viewing the patient in an entirely different light from that shown during the rest of the day, and so the nurse may again be the real source of accurate information to the medical attendant, who must be told of any unusual attitudes taken up by his patient. As a general rule, abdominal pain causes the latter to lie in bed on his back, with his knees drawn up, since this position takes all the tension from the abdominal muscles. Intermittent pain in the abdomen, caused by colic of digestive or renal origin, makes the patient unsettled, apprehensive, and restless; during an attack he will double himself up and press his hands on the abdomen as if to "squeeze out" the pain. All people affected with acute lung ailments or with chronic defect of the heart adopt the upright position in bed, as it gives the accessory muscles of respiration more scope to do the extra work entailed, and minimizes the pressure of superfluous fluid in the thorax. In very severe heart disease, the patient may not be able to remain in bed at all; frequently the nurse has to report that he has spent the night sitting up in an arm-chair. When severe pain exists in the side of the chest, the patient

usually likes to lie on the affected side for two reasons. First it gives the sound side the maximum range of movement, and secondly it puts the affected lung or pleura in the position of greatest inactivity, and so reduces the pain to the minimum. Unconsciousness is a condition which results from numerous physical states, and the behaviour and attitude of the patient in the state of coma are in a category by themselves. The nurse should note all the evidences of rigidity, twitching, convulsions, or the passive, almost lifeless, condition of grave collapse which may be found.

The Importance of Pain.—Pain is a symptom, but it is too dramatic to be unheeded, therefore it is perhaps the outstanding subjective demonstration of the patient which requires careful investigation. Of the varieties of pain, nothing need be said at this point, since later on this symptom is fully discussed, but the nurse should bear in mind that pains vary in intensity and patients vary in sensitivity, so that there is a wide range of variety in the sensation of pain. The experienced nurse must learn to shut her ears to the wails of the hypochondriac, while she must be on the alert for the casual and mild complaint of the impassive person. The slightest pain may mean a serious complication, but the converse is equally true. Real pain is upsetting to all the *sensory* sides of the patient's system; when it recurs at regular intervals, and with unvarying characters, it is a sure sign that it is a proper interpretation of the defect which prompts its occurrence. If it is realized that pain is a signal of desperate fighting to maintain normality against odds, a clear understanding will be gained of the value of the symptom, and of the danger of assuming that because it has passed off into less demonstrative type, the case is past the worst. Experience of acute appendicitis is one proof of the fallacy of concluding that relief of pain means recovery; often when pain passes off in this ailment it is the sign of abscess formation, the danger of which need not be emphasized.

Special Points.—Particular attention should be paid to the presence of pallor, flushing, or cyanosis of the face. Look at the forehead and neck for a rash. Make a note of the state of the mouth, lips, tongue, and teeth. In certain states of fever or of grave debility, the lips are cracked and dry; there is found on neglected teeth a layer of dry, light-brown mucus and salivary deposit (*sordes*), and the tongue may be dry and furred with a white or yellow-white layer; the mucous membranes of the inside of the mouth are lustreless; the pharynx and the region of the tonsils may be angry and red. In respiratory diseases, the difficulty in breathing is evident; the beads of perspiration round the mouth, the frequent attempts made by the patient to moisten the lips with his tongue, and the dilatation of the

alæ nasi, together with the bloodshot eyes, all point to acute pneumonia or some other fever of that type. In the absence of active symptoms, when the general attitude of the patient is dull, disinterested, and negative, but when he displays the signs mentioned in the first part of this paragraph, we may suspect typhoid fever, or at least the " typhoid state " which is frequently the sign of very grave collapse. The nurse, even although she may be wrong, should write down in her notes anything she deems to be abnormal; if she has been over-zealous, nobody will criticize her. It is much better to admit to sins of commission rather than to be guilty of sins of omission.

Keeping of Records

In addition to the case-sheet filled up for each patient, there is the familiar so-called " temperature chart," which must be kept up-to-date by the nurse. While the notes of examination,

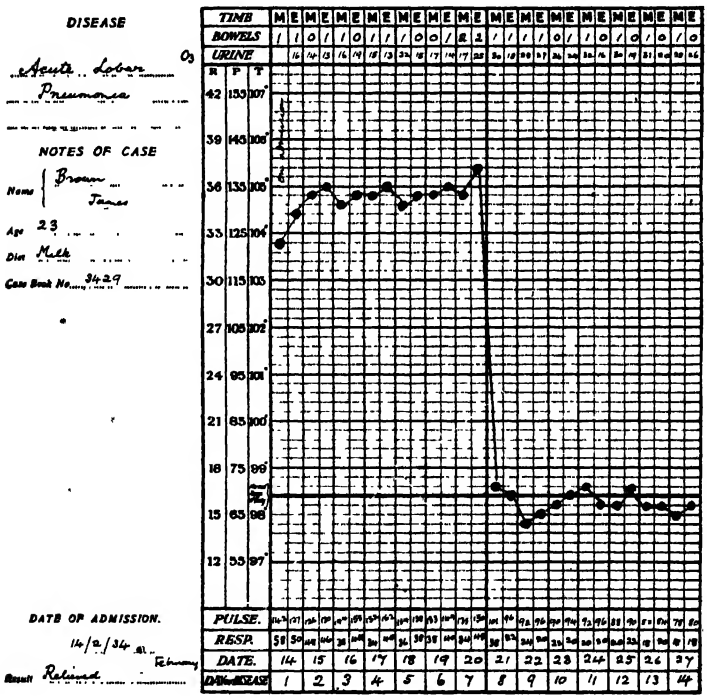


FIG. 61.—DAILY TEMPERATURE CHART (PNEUMONIA).

(By courtesy of the Surgical Manufacturing Co., Ltd., London.)

treatment, and progress are entered almost invariably by the qualified medical man or the advanced student, the entering-up of the details on the temperature chart is in the nurse's province, and therefore a knowledge of correct charting is essential

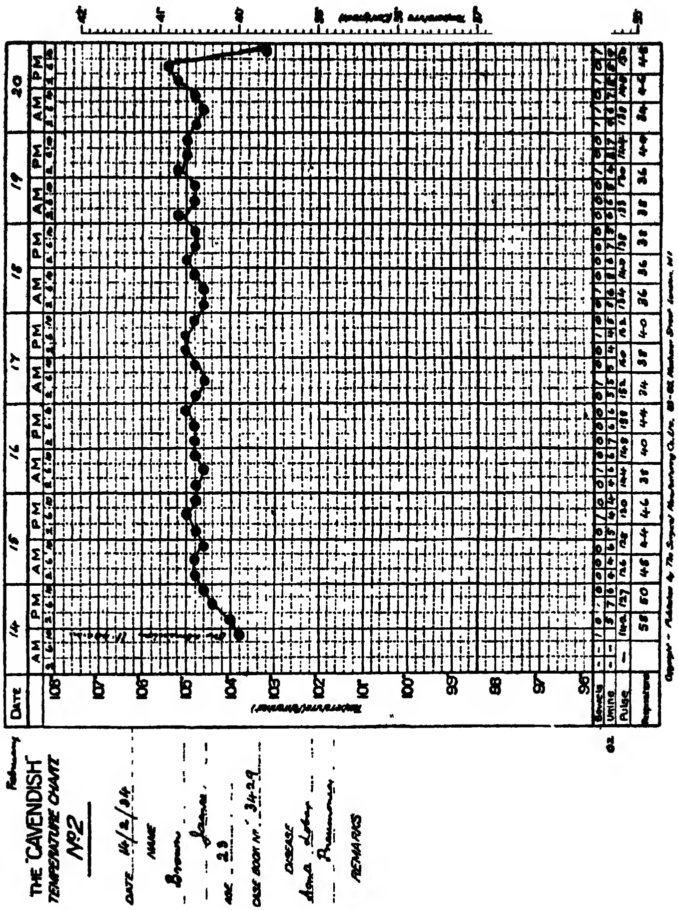


FIG. 62.—F LY TEMPERATURE CHART (PNEUMONIA).
(By c Surgical Manufacturing Co., Ltd., London.)

to the proper conduct of the case. The ordinary temperature chart is of two varieties, the four-hourly chart for acute cases, and the "morning-and-evening" chart used for all cases. But, as mentioned above, the temperature chart is not a document which registers the fluctuations of the temperature alone.

The six main particulars are:

1. The date.
2. The pulse-rate, morning and evening.
3. The average rate of respiration, morning and evening.
4. The day of the disease.
5. The daily amount of urine passed.
6. The number of bowel motions for the day.

The temperature chart is made up of vertical and horizontal lines, the former dividing the chart into days and weeks, by thin and thick lines respectively; the latter indicating the level of temperature by degrees, which are marked on the left-hand margin of the sheet. A dotted or heavy black line indicates the level of the normal temperature. In some cases there is a line for every two-tenths, so that very accurate recording is possible. This is done by making a small neat dot in the appropriate column and at the proper level. By joining these dots with fine lines a very clear graph is obtained which has peculiar characteristics according to the disease. Experience soon teaches the nurse to recognize anything unusual on the chart at once, and therefore it is a most useful and almost indispensable record in her work.

The Temperature

The "normal temperature" of the body is an index registering the amount of heat in the tissues maintained as a result of all the influences which heat or cool the blood.

The Clinical Thermometer.—The expression *taking the temperature* is commonly used to describe the process of ascertaining the heat of the body at a given time. The instrument in use, the clinical thermometer, is a small glass tube with a bulb at one end. In this bulb is mercury, a substance which is of such sensitivity that it expands as soon as it is warmed by the slightest amount of heat. The level of the mercury in the bulb is so adjusted that

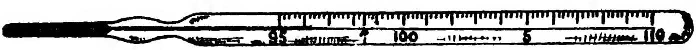


FIG. 63.—CLINICAL THERMOMETER.

it rises into a narrow canal formed by the glass tube when heat is applied to it. Naturally the mercury will rise to various levels according to the temperature of the substance with which it is in contact. By grading the glass tube in degrees, we obtain a scale which is a register of the heat. Three kinds of thermometer are in use—the Fahrenheit, the Centigrade, and Réaumur; but since the Fahrenheit type is in universal use in the United Kingdom, it is the only one fully described in this work.

The Centigrade thermometer is much used by scientists, and ranges from 0° (freezing-point) to 100° (boiling-point), or much higher according to the need. The Réaumur thermometer is used in France; its freezing-point is 0°, but its boiling-point is 80°. The thermometer registrations can be compared and expressed in terms of each other by doing simple calculations which need not be dealt with here.

The Fahrenheit Scale.—The Fahrenheit thermometer is used by every nurse, therefore it is essential that its mechanism should be fully understood. The lowest point is 95°, a level very close to the bulb. At equal intervals, the levels above are marked by narrow lines cut into the glass and painted black. In this way the indices of temperature are engraved from 95° to 110°; in other words, the range likely to be met in dealing with the heat of the human body under varying conditions of health. Each division on the glass is further subdivided into five other small, equal divisions by very fine grooves on the glass; these represent fifths of a degree and are spoken of as ·2, ·4, ·6, and ·8. A small black arrow is cut into the glass with the point at the line indicating the level of 98·4°. This clearly defines the level of the *normal temperature.* Other markings on the thermometer, apart from the name of the maker, are indications about the length of time the thermometer should be left in the site at which the temperature is being taken. We read the words, "½ Min.," "1 Min.," "2 Min.," etc., and this means that the thermometer must be left, *at least*, for the period stated. As a matter of fact, it is always best to err on the safe side, and to leave thermometers in for several minutes. This is usually the routine in most hospitals. Certain thermometers are more expensive than others, and are very accurate. Those tested at the National Physical Laboratory are marked "N.P.L.," and are absolutely trustworthy in every respect. Great care should be taken with thermometers at all times. If they are carried on the person, they should have a stout metal case with a small pledget of cotton-wool soaked in disinfectant, preferably lysol; when belonging to the ward or sick-room, they should be kept in a small glass jar containing 1 in 60 phenol, the bottom of the jar being padded with several pieces of lint or with cotton-wool. The probationer who attempts to "sterilize" the clinical thermometer by boiling only does it once if she has the responsibility of replacing breakages.

How to Take the Temperature.—The first thing to do is to rinse the thermometer in cold water. It should then be held with the bulb pointing outwards and flicked vigorously several times until the mercury is steady at a level of about 96°; this procedure usually dries the glass sufficiently. Four well-established sites have been adopted for temperature estimation.

The commonest is the mouth, under the tongue; the others in order of popularity are the axilla, rectum, and groin. The choice of site depends upon the type of patient. If there is any danger of biting through the thermometer, e.g. in nervous, convulsive, or mentally afflicted adults, or in young children, the groin or axilla is preferred. The rectum is chosen in certain diseases, and usually for a specific reason known to the physician. In a series of temperature records, it is essential that they should be the readings at the same time and in the same place each day, as otherwise errors are allowed to come into the chart which upset the true history of the case.

Temperature of the Mouth.—The ideal conditions for taking the temperature of the mouth are those in which there has been no possibility of extraneous heat for about half an hour previously. Obviously, if a patient has been lying in bed with a poultice on his cheek, the mouth is not the place for the thermometer, but in ordinary cases all hot drinks, exposure to the fire in the room, and even smoking should be forbidden for the period stated above. Excessive cold must also be prevented. It will be found most satisfactory if the patient is told to put out the tongue with the mouth half-open. The thermometer, checked and prepared, is then placed with the bulb well under one side of the tongue, passing over the lower bicuspid teeth. The patient is warned to avoid closing the teeth, but told to press on the thermometer with the tongue, while keeping the lips firmly closed; and he must be reminded that speaking is forbidden. The procedure to be adopted with mental patients is referred to later.

Temperature of the Axilla and of the Groin.—These two sites can be discussed together, as the procedure is much the same in both. The longer the thermometer is left in position the better; at least five minutes should be allowed. Before inserting the bulb, make sure that the axilla is not wet with perspiration, and that there has not been any source of heat (such as a fomentation, a hot-water bag, or a poultice) near the axilla for at least twenty minutes; the same precautions apply to sources of cold, e.g. the ice-bag in pneumonia cases. All washing and dressing of wounds should have been completed at least half an hour previously. It is essential to make sure that the bulb and as much as possible of the stem of the thermometer is covered by the folds of the skin, which should be closely in contact. In the axilla, therefore, it is best to place the bulb right in the angle between the arm and the chest wall, avoiding the danger of breakage by laying the stem practically parallel to the arm and kept in position by carrying the arm across the chest, with the hand over the opposite shoulder, while the elbow is better supported by the patient's other hand. In the groin, the thermometer should be laid in the furrow at the top of the thigh, while

the thigh is flexed on the abdomen, or the legs crossed above the knees.

Temperature of the Rectum.—Although not very often used, this method gives the most accurate reading, as there is the minimum chance of heat loss. It is the approved method for very young children, for unconscious patients, and for those emaciated by chronic disease or injury. Unless the rectum is clear of fæces, the method is useless. The patient should be placed on his left side with the knees drawn up. The thermometer is lubricated with olive oil and passed through the anus for about 1½ inches, where it is retained steadily for about two minutes, the nurse holding the free end during the process. *The patient must never be left with a thermometer in the rectum.*

In all the above methods, if the same thermometer is used for successive registrations, it must be very carefully cleansed and checked before it is inserted. If there is any doubt about the reading, it should be again made by another thermometer, and a second opinion is always advisable. Certain patients take a delight in interfering with the thermometer, and even " cook " the instrument by putting it for a moment on the hot-water bag, or by rubbing it vigorously. The strictest discipline must be observed at " temperature time "; in all doubtful cases a watch should be kept.

The Normal Temperature.—This expression is used to denote the level on the Fahrenheit scale which is reached by mercury when a thermometer is in contact with the tissues. As stated on the thermometer, the normal reading is 98·4°. This does not mean that a reading a little above this or a little below it is not compatible with health. Indeed, there are many factors which vary the reading. The rectal temperature is about 1° more than that of the axilla, but it is not so great as that of the blood, which may be taken as about 101°. A reading of 97·4° in the mouth may not mean anything serious; as a matter of fact, it is often found in those who enjoy robust health. At the other end of the scale, it is different; any registration above 99° should be regarded with suspicion. An important point is that the temperature varies during the twenty-four-hour day. It is highest in the evening about 5 p.m., and lowest at 2 a.m., when all the bodily functions are universally depressed. There is thus a *peak* and a *valley* in the chart when the accurate hourly figures are plotted on paper; the rise and fall are very gradual. Sensitive people may demonstrate greater diurnal variation than those of stouter constitution, although it may not be found that any disease exists. Common causes of slight rise are exercise, eating, and excitement. Temperatures in a ward are notoriously elevated after visitors' days.

Abnormal Temperature.—Wide deviations from the 98·4° mark, either above or below the arrow, indicate some abnormality. A subnormal temperature is associated with extreme debility, the collapse of shock, general failure of the circulation, or the very weak condition following severe diseases such as enteric fever, diphtheria, or dysentery. The readings are always below the 97·6° mark, but in extreme cases a figure as low as 95° may be registered. Death occurs when the temperature falls below 93°.

Above the normal level, the readings vary according to the disease or fever causing them. The amount of temperature is not invariably an indication of the seriousness of the signs and symptoms. A temperature of from 98·8° to 99° may be found in many so-called mild diseases and " low fevers " which make the patient very miserable. A reading of 99° should never be referred to as " *only* 99! " The subfebrile state is that between 99° and 101°, the moderate pyrexial state between 101° and 103°, while *pyrexia* is said to exist when the temperature runs from 103° to 105°. Above 105° the state of *hyperpyrexia* is established, and it may be found in heat stroke or in very acute fever, indicating that the mechanism of heat regulation has been seriously affected. In life, a temperature of 110° F. has been known, but death has soon followed.

It is obvious that with all the above variations of temperature, the taking of the temperature in certain diseases is a very important matter, as certain ailments are associated with fixed levels, and the progress of the disease can be gauged from the temperature chart. Fundamentally, the heat-regulating mechanism, apart from extraordinary external influences like an excessively heated atmosphere, is affected by the reaction of the blood to the invasion or excessive activity of germs. The condition of *fever*, with its high temperature and all its other signs, is one resulting from the efforts of the body to overcome foreign germs or their toxins, and the higher the temperature the more is it an indication that a brisk fight is in action. Most doctors prefer to see a good-going rise of temperature than an unsatisfactory " bubbling " above the black line on the chart.

Types of Fever.—First there may be an increase in the ordinary nightly elevation, and a register of some degrees lower in the morning temperature; an examination of the temperature chart gives the impression that the whole curve of temperature has been moved from the region of the black line to a level farther up. There is often a variation of 3° between morning and evening temperature, but the state of fever never allows the curve to fall below 99°, or higher. This type is called *remittent temperature*, and is found in acute septic infections, in bronchopneumonia, and in typhoid fever during the second week. In

certain diseases the fever is high and practically continuous, so that the chart shows a line almost parallel with the normal line usually in the region of the 103° level, and is characterized by slight, if any, daily variation. To this type of temperature, the name *continuous temperature* is given; it is found in pneumonia, scarlet fever, etc.

A third type of temperature is known as *intermittent temperature*. In this, there is a period of normal or subnormal temperature lasting a few hours or a few days. The temperature "swings"

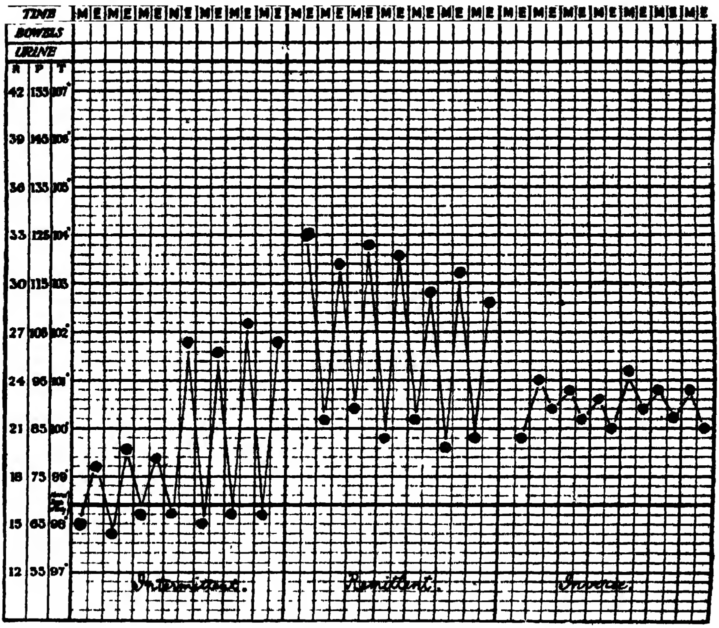


FIG. 64.—THREE COMMON VARIETIES OF FEVER.

(By courtesy of the Surgical Manufacturing Co., Ltd., London.)

widely, and indicates serious disturbance of the blood. We expect to find it in acute septicæmia, pyæmia, and in malaria, in which the charts demonstrate high peaks at night and deep valleys in the morning. In certain types of malaria the valley may last for two days. This type proves the necessity of taking the temperature at least twice a day. If we were to depend upon the morning temperature only in these acute conditions, there might be very little to record in the way of fever, and the signs would be puzzling. Lastly, there is a somewhat rare type of temperature, which is found now and then in phthisis; instead

of a rise of temperature at night and a fall in the morning, the opposite occurs; this is called *inverse temperature.*

The Febrile States Summarized.—Correctly speaking, fever is rise of temperature accompanied by marked disturbances of the constitution, as shown by headache, perspiration, dry mouth and tongue, constipation, muscular pains, quick pulse, shivering, i.e. the reaction of the whole body to the attack of a mass of germs. Pyrexia is concerned with rise of temperature alone, but the two terms pyrexia and fever are often spoken of as one and the same thing, and it is rare that the state of pyrexia is unaccompanied by fever.

The table given below shows the various ranges of temperatures:

Degree.	*Name.*	*Occurrence.*
96–95	Collapse	Extreme debility; shock.
98–96	Subnormal	Cold; hunger; debility; sometimes natural to the individual.
99–101	Subfebrile	Chills, colds, influenza, etc.
101–103	Moderate pyrexia	Pneumonia, infectious diseases.
103–105	Severe pyrexia	Malaria, septicæmia, acute infection.
105 upwards	Hyperpyrexia	Heat stroke, terminal stage of blood-poisoning, etc.

Rigors.—When the patient is suddenly attacked by a new or fresh crop of microbes, there is first a flooding of the tissues with the poisons made by the organisms. The body is temporarily depressed by them, and a great and dramatic effort is made by the tissues to neutralize the toxins. This is the condition of *rigor*, which may occur as the starting-point of an illness, or as an incident during the course of an illness. It rarely lasts more than half an hour. To begin with there is a feeling of cold, the patient turns pale, and the whole body is seized with a shivering fit which can be heard and felt by those in the vicinity; it is almost a convulsion. The temperature usually shoots up to 104°. After about ten minutes, the face becomes red with a dry flush; the patient is restless, thirsty, and complains of headache; this is relieved almost immediately by a vigorous perspiration, which may rapidly soak the clothing and even the bed. At this stage, the temperature falls as rapidly as it rose, leaving the patient in a weak state almost as bad as that of shock. The whole action goes on so quickly that often the rigor is over before

any treatment can be applied, but the after-treatment is the most important, and should never be missed. The patient requires to be carefully sponged and dried well, and hot-water bags should be placed at his sides and feet. Stimulants may be ordered by the doctor. Obviously a rigor occurring with frequency causes a rapid debility of the patient, and such sharp and sudden strain is one of the gravest dangers in disease.

Termination of Fever.—Fever can end in two ways—by *crisis* or by *lysis*. An example of the former is provided by an attack of pneumonia which runs the normal course. After seven days of continuous moderate or severe pyrexia, the temperature suddenly falls to normal or subnormal level. There is a magical effect on patient and attendants, as, within twelve hours, a struggle of magnitude is resolved into a quiet and peaceful era of contentment, in which the patient appears perfectly comfortable and usually wants to sleep. Care must be taken at this very critical juncture, however. A crisis may be accompanied by marked sweating, and even diarrhœa and collapse, so that although the temperature has fallen, the patient is not out of the wood. Lysis is a more gradual descent of the temperature level, and may occupy three or four days, with an accompanying steady improvement in the general condition; it is common in many infectious diseases.

Times at which Temperature should be Taken.—In a four-hourly chart, the usual hours at which the temperature is recorded are 2 a.m., 6 a.m., 10 a.m., 2 p.m., 6 p.m., and 10 p.m., but in critical or acute cases, observation of the temperature may be necessary at more frequent or more irregular intervals. The ordinary morning-and-evening chart should be based on the temperature before breakfast and before supper, taken some time between 7 and 8.

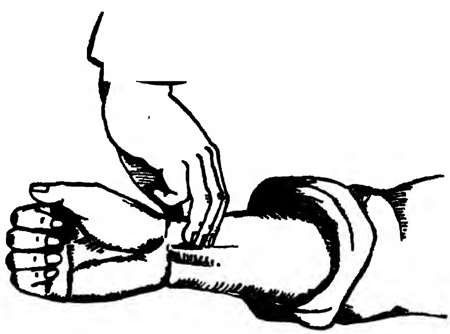


Fig. 65.—How to Examine the Pulse. (Near view.)

The Pulse

Every time the heart beats, it sends a wave through all the arteries, so that they are momentarily expanded and enlarged as the increased volume of blood passes through. This causes *pulsation*, which in the human subject can be observed in any part at which an artery lies superficially. Thus the phenomenon

can be observed in the temporal artery, in the carotid artery of the neck, and elsewhere. But, as we already know, the classical area for the investigation of the pulse is at the *wrist*. Here, the radial artery runs down just medial to the lateral aspect of the radius, and will be found very superficially placed at a point about an inch above the junction of the hand and wrist.

How to Estimate the Pulse.—The estimation of the pulse should be made with the index, middle, and ring fingers of the right hand. The middle finger should be used to make the count of the beats, and at least half a minute should be allowed as the unit of time. It is best to approach all patients, but especially those very ill or very nervous, without ceremony or preliminary. When the fingers are placed on the patient's wrist there is, to begin with, an emotional or excited response by the nervous system, and the rate is increased, therefore it is an established custom to talk to the patient and to ensure that there is no worry in his mind about the examination. Once it is certain that the pulse is at its normal, usually after about a minute, the official count can be taken and all the other points noted. It is best to make sure that there is no constriction or compression of the arm interfering with the circulation at the wrist. During the pulse-test, the patient's hand should be placed with the back uppermost, while the examining hand passes over the back of the wrist to allow the tips of the fingers to feel the artery from below; it can then be pressed against the radius.

Pulse-rate.—This is stated as the number of beats per minute, the normal rate being 72, but a little less or a little more is quite compatible with sound health. It must also be remembered that, as mentioned previously, digestion, exercise, heat, cold, excitement, the taking of alcohol, etc., all tend to raise or lower the rate slightly.

A *frequent* pulse is one between 80 and 120. It is evidence of the condition of tachycardia, which occurs in very nervous persons, in those suffering from exophthalmic goitre, in bloodlessness, in indigestion, in pyrexia, and those who have been over-indulgent in tea or tobacco.

A *rapid* pulse is one between 120 and 160, and is found in all very acute infections such as blood poisoning, scarlet fever, rheumatic fever, etc.

A *running* pulse may exceed the 180 mark, and its rate may be so fast that it is impossible to count the beats; it is always a sign of great danger. It is associated with shock, collapse, and impending death.

Bradycardia is the condition of slow pulse, and means anything below 60 beats a minute. It may occur as a natural phenomenon of old age, but usually it is found as a serious sign of

brain injury or disease, of comatose states, and of advanced heart disease.

Generally speaking, if the temperature rises, there is an increase of pulse-rate with it. A rough method of estimation in use allows about 10 pulse-beats for every degree of rise. Thus in a fever with a temperature of 102°, we should expect the pulse to be about 110. There are notable exceptions to this rule, however. When a patient is suffering from an overwhelming attack of virulent germs, the pulse may be very fast while the temperature is moderate; the thermometer may register only 100°, but the pulse may be 130. This is common in blood poisoning, acute rheumatic fever affecting the lining of the heart, peritonitis, and scarlet fever. On the contrary, a group of diseases, including pneumonia, typhoid and paratyphoid fevers, is characterized by high temperature and a rate of pulse which is comparatively slow. For instance, a common chart entry in pneumonia is a temperature of 103° and pulse of 100. If the pulse begins to increase in rate, it is a very bad sign, especially if the temperature is steady or shows signs of falling; heart failure is indicated.

FIG. 66.—EXAMINATION AND ESTIMATION OF THE PULSE.

Volume.—The examining fingers, in rolling the radial artery beneath the skin against the radius, obtain impressions of the state of the vessel wall, of the size of the vessel, and of the tension of the contained blood.

Thus the pulse may be bounding and *full*, and apart from excitement, may be evidence of a fevered condition. The heart is making its biggest effort to pump the maximum supply of blood at each beat.

The opposite condition is one in which the pulse is *small*. This

may be due to weakness of the heart's action, especially when there is poor muscular tone in long and debilitating disease. The term *thready* pulse is applied to a pulse which admits the minimum volume of blood through at each beat. It may be due to weak heart action, falling blood-pressure, and congestion of the veins.

Tension.—This is not a very good term, although it is a very old one. It involves two conditions. The first is one in which there is hardening and thickening of the walls of the radial artery as part of a general disease known as arterio-sclerosis. The artery may even run a tortuous course, easily appreciated by the fingers. When an attempt is made to stop the pulse, great *compression* is required, and according to the facility with which the vessel can be closed, the amount of *compressibility* is defined. A pulse is *soft* or *hard* according to the state of the vessel walls. The second condition is one in which the pressure of the blood in the vessel is so great that the power required to overcome it is considerable; this is the true state of high tension. The state of the blood-pressure is determined by using the sphygmomanometer. The common cause of increased tension is inflammation of the kidney, which increases the peripheral resistance.

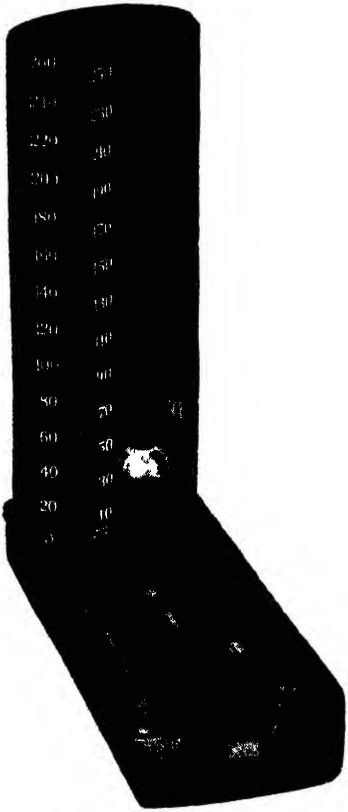


FIG. 67.—MERCURIAL SPHYGMOMANOMETER IN DURALUMIN CASE, COMPLETE WITH BALL VALVE AND ARMLET.

(By courtesy of Messrs. Willen Bros., London.)

A *compressible* pulse results from loss of tone of the arterial muscles, which are *soft*, and it indicates flabby heart muscle and general weakness of the central pump. This type of pulse is found in typhoid fever, diphtheria, phthisis, and other fevers; as well as in the semi-collapsed state of prostration following a few weeks of serious

illness. Sometimes also in these states the elastic recoil of the aorta sends the secondary *dicrotic* wave bounding along with much bigger volume, and thus not one, but two, beats are felt at the wrist, a large one followed by a small one.

Rhythm.—Normally the pulse should be regular in *time* and *force*, i.e. there should be the same *strength* in each beat, and unvarying intervals between the beats. The pulse can be irregular in time, the intervals between the beats being long and short in haphazard fashion. It can also be irregular in force, one beat being much more forcible than the next. When a combination of both occurs, it is a serious matter, and indicates some fundamental breakdown of the valves of the heart or of the compensating mechanism, or overdoses of certain drugs, or the terminal stages of exhausting infections such as diphtheria. The most advanced type of irregularity is found in *auricular fibrillation*, a condition in which there is complete disorganization of the heart rhythm, and the radial pulse shows every deviation from the normal—unequal intervals, uneven beats, sudden increase of rate, and frequent phases which are imperceptible.

Other Types of Pulse.—*Intermittent Pulse* is the apparent missing of one beat, but it really indicates the crowding of one beat on another, due to premature or extra systole of the heart. The consequence is that there is feeble power in the extraordinary beat, which is not felt at the wrist. A beat is thus apparently missed. It is not a dangerous sign, and is always associated with a slow pulse. Excessive smoking of cigarettes may lead to the condition.

Corrigan's Pulse, also known as the *water-hammer*, or *collapsible*, pulse, is found in cases of marked failure of the aortic semilunar valves, which cannot hold the volume of blood issuing from the ventricle. The result is a rapid fall in volume and force after each beat. The pulse is regular and strong, but rapidly falls away after each impression is made on the tip of the examining finger.

Capillary Pulsation is associated also with aortic regurgitation. The terminal arterioles, full as they are of blood forced suddenly into them, get rid of their contents with a minor wave which is easily observed by closely watching the skin; this is known as *capillary pulsation*, and amounts to a sudden blush followed by momentary pallor, the cycle co-ordinated with the beat of the heart.

Heart-block Pulse is a pulse as slow as 25 per minute. It results from defect of the nervous mechanism and may be said to indicate the contractions of the ventricle partially or completely free of its pace-maker. It is a serious condition, often accompanied by fits.

Lastly, it should be remembered that there may be differences

in the radial pulses of each side; this is very marked in aneurysm of the aorta; often it is advisable to compare the pulse of one side with that of the other.

Respiration

Normal breathing is quiet, regular, painless, and at the rate of about 18 respirations per minute. It is increased when the carbonic acid gas is in excess in the blood, and in any condition in which there is a demand for more oxygen, e.g. in exercise, in taking food and digesting it, and in excitement or worry. It is diminished when a person is at rest or very tired.

Rate of Breathing.—In the first year of life the respirations gradually diminish from 36 per minute to 25 per minute; from the age of 4 the normal respiration slowly approaches the adult level of 18 per minute, reached about the age of 16. In examining for rate of breathing, we can adopt two methods. The first consists of looking at a fixed point on the chest-wall (e.g. at one of the upper intercostal spaces, in the nipple line), and, if possible without the patient's knowledge, taking a count of the total number of rises or falls per minute. The other method is only to be used in special cases in which the visual examination is not satisfactory; it consists of laying the palm of the hand flat on the upper part of the thorax, and of actually feeling the rise of the chest wall.

Normally the ratio of pulse to respiration should be 4 : 1. An increased rate of respiration is found in pneumonia, phthisis, bronchitis, fevers, hæmorrhage, shock, abdominal inflammation, heart disease, pleurisy, anæmia, and nervous troubles. A decrease occurs in all comatose states resulting from disease or injury to the head, fracture of the skull, concussion, compression, cerebral hæmorrhage, poisoning by alcohol, opium, or uræmia; it is found in the dying and emaciated.

It should be also noted that one of the infallible signs of the onset of vomiting is markedly increased respiration.

Varieties of Breathing.—Breathing may vary according to rate, to depth, to rhythm, to type, etc. The chief abnormalities are discussed below.

Dyspnœa.—The meaning of this term is *difficult breathing*. The picture of dyspnœa is not easily forgotten; the patient usually is very disturbed, sitting up in bed, restless and anxious, and changing his position every minute in an attempt to get the proper amount of air into his lungs. Dyspnœa is to be expected in all diseases which involve obstruction to the air-passages. Thus it is the chief symptom in asthma, broncho-pneumonia, bronchitis, and occurs in heart disease accompanied by congestion of the lungs with fluid. *Air-hunger* is a special variety of dyspnœa, in

which the patient makes desperate sighing efforts to make his blood properly oxygenated. It is found in diseases such as uræmia and diabetes, in which the blood is upset in composition by foreign substances which circulate as poisons instead of being broken up and excreted, and in cases in which much loss of blood has occurred.

Orthopnœa.—The degree of dyspnœa varies with the disease. In very severe illnesses affecting the heart or the lungs, dyspnœa may develop into an extreme condition of *orthopnœa*, in which the patient may adopt most unusual methods of getting relief from the laboured breathing. Orthopnœa is usually a terminal sign of heart failure; when the tissues are swollen with fluid, and the lungs are encumbered by it almost to the point of strangulation, the most extreme efforts must be made to obtain air. The patient finds that relief is only made possible by adopting the upright position in an arm-chair; sometimes he will lean forward with his head on a pillow. Cases have been known in which the patient benefited by kneeling on the pillows of his bed with his face to the iron bars at the top of the bed, and his arms over the bed-rail. The idea is to take as much extra strain from the lungs as possible, and since the abdominal organs, themselves suffused with fluid, press heavily on the diaphragm, the more they are allowed to droop towards the pelvis the better. The state of orthopnœa is one of the most difficult to nurse, and demands special methods quite out of the usual run of ward routine.

In other chest diseases, dyspnœa is a dramatic symptom, but it is not so desperate as orthopnœa, although it alarms those unaccustomed to it. In asthma, for instance, the seizure is sudden, the patient sitting up in bed, with bluish congestion of the face, with noisy, wheezy breathing, and with all the accessory muscles of respiration in full play. The sighing and prolonged and strained respiration add a pathetic character to the attack, which is really not so bad as it looks, since the spasms often disappear as quickly as they come.

Stridor.—An obstruction of the larynx by a foreign body, by pressure of a new growth, by the spasm of croup, or by the diseased membrane of diphtheria causes a type of respiration in which there is a long "crowing" respiration. Sometimes the efforts to breathe are so marked that the intercostal spaces seem to be sucked in like bellows. To this type of breathing, with its harsh, grating quality, the name *stridor* is given, while *stridulous breathing* is the term used to designate any breathing with the quality of stridor present.

Stertor.—*Stertorous* breathing arises in the soft palate, which is sometimes paralysed as a result of injury or nervous disease; it is akin to the snoring of those in a profound sleep, and occurs

when there is unconsciousness resulting from head injury, cerebral hæmorrhage, kidney and diabetic coma, etc. As the air passes backwards and forwards, it causes a vibration of the curtains of the palate, and *stertor* is produced.

Accompaniments.—In bronchitis the dyspnœa is not marked, but the respirations, with their characteristic wheeze, and their numerous whistling and cooing accompaniments, advertise the diagnosis of the complaint from the far end of the room.

Pneumonia, on the other hand, although much more serious than bronchitis, is characterized by quiet respiration, which is increased in rate. Standing at the bedside of a pneumonia patient, the nurse will be able to appreciate the soft crackling noise of the respirations, due to moisture in the alveoli, but the patient exhibits none of the desperate methods of, say, the asthmatic. Sometimes breathing becomes very shallow and almost imperceptible, owing to the onset of painful pleurisy, which forces the patient to make as little effort as possible in breathing. The greater the number of respirations, the shallower they become.

Apnœa.—Apnœa simply means a stoppage of breathing for a temporary period. It is found in certain cases in which there is imbalance between the oxygen intake and the carbonic acid gas output. The breathing suddenly stops, resuming its cycle when the body has adjusted itself.

Cheyne-Stokes Breathing.—As this is a very dangerous sign, often preceding death, and occurring frequently in unconscious persons, all nurses should learn to recognize it. This is not a difficult matter; after a few months of night duty, a nurse can train her ear to pick up the fundamentals of Cheyne-Stokes breathing from a long distance; indeed, it is a good way to study the phenomenon. For a few seconds, the breathing is apparently normal. Then the respirations seem to become faster, while the patient takes deeper and deeper breaths; a certain crisis is reached, like the end of a *crescendo*, after which there is a gradual inversion of the process, ending in a stoppage of the breathing for a few seconds, and a re-start of the whole process. There are various explanations for this peculiar rhythm; probably it is due to the stimulating effect of lactic acid, which needs more oxygen to split it up into water and carbonic acid gas. The pause is a result of excessive expiration sending out too much carbonic acid gas; when the latter again accumulates, respiration is once more stimulated.

Cyanosis.—We can grow " blue in the face " from several causes; when the latter are serious, the complexion is typical. If the blood is deficient in oxygen, and contains too much carbonic acid gas, the capillaries are full of blue blood, which

shines through the mucous membrane and the skin of the face, showing itself especially in the tip of the nose, the lobes of the ears, the lips, and the cheeks. *Blue asphyxia* is the most marked variety, and is found in sudden cases of obstruction to the breathing (choking, acute diphtheria, etc.). In very advanced heart disease, the whole face becomes plum-coloured and cold. The fingers and toes are also effected. Cyanosis is always a fatal sign in such states.

Cough and Spit.—All respiratory diseases are accompanied by cough, and usually a *sputum*, or spit, is found. Further reference is made to these signs later on in this work.

CHAPTER 6

DRUGS AND THEIR ACTIONS

SCIENCE OF THERAPEUTICS. NOTES ON THE COMMON TYPES OF DRUG. LAXATIVES. PURGATIVES. CATHARTICS. SALINES. EXPECTORANTS. ANTIPYRETICS. SEDATIVES. HYPNOTICS. NARCOTICS. ANTHELMINTICS. CARDIAC DRUGS. DIURETICS. DIAPHORETICS. DRUG TOLERANCE. WEIGHTS AND MEASURES. THE IMPERIAL SYSTEM. COMPARISON BETWEEN WEIGHTS AND MEASURES. COMMON HOUSEHOLD MEASURES. THE PRESCRIPTION. THE FORM OF THE PRESCRIPTION. A TYPICAL PRESCRIPTION. COMMON ABBREVIATIONS IN PRESCRIPTIONS.

ALL the drugs used in the United Kingdom are governed by the *British Pharmacopœia*, which is published by the General Medical Council and which is the official manual in use. Another (unofficial) volume is called the *British Pharmaceutical Codex*, published by the Council of the Pharmaceutical Society of Great Britain. While many of the preparations used in the latter are not included in the *British Pharmacopœia*, and are therefore "unofficial," they are, nevertheless, frequently employed by doctors in general practice. The *British Pharmacopœia* was last revised in 1932, and many changes were made. It is now customary to write the letters "B.P." after the official drugs, while the expression "B.P.C." is used to denote drugs which are taken from the *British Pharmaceutical Codex*.

Science of Therapeutics

Pharmacy adopts a classification of the drugs according to their chemical properties. It involves certain well-established methods of refining and compounding drugs. In the various processes, great accuracy is observed, the system of weights and measures being employed as defined in a later paragraph.

Dispensing means the putting together into a mixture, pill, or other form the drugs prescribed by the physician; it is obvious that if the patient is to derive the maximum benefit from his treatment he must be certain of having the drugs dispensed not only accurately, but also elegantly, so that there is art as well as

science in this branch of the profession. There are certain standard preparations which are stocked by the chemist and druggist for constant use. These are of a strength and quality officially sanctioned by the *British Pharmacopœia* or by other representative authorities, and include *extracts*, *infusions*, *liniments*, *lotions*, *liquors*, *oils*, *spirits*, *syrups*, *tinctures*, and numerous other forms as well as the *simple drugs* themselves.

In the preparation of a mixture or a pill for a patient, therefore, the dispenser has the orders of the doctor on the *prescription*; he has the various ingredients handy on his shelves; he weighs and measures the quantities; adds the constituents one by one to the mixture or mass, and prepares the whole in the approved way; finally, he sends out the remedy to the patient, or to those responsible for the patient, with full instructions as to dose.

In *materia medica*, we have to deal only with the action of drugs on various systems of the body. Our classification here takes the form, therefore, of a grouping of drugs according to the effect they produce on certain parts of a system or systems with which they come in contact. A drug may have a *direct* action or an *indirect* action; an *immediate* action or a *delayed* action; a *primary* action due to the unaltered drug, or a *secondary* action, due to the formations of compounds within the body. It is impossible to deal with every drug in the limited space at our disposal, but in the following pages a brief description of the main groups is given, in the hope that mental nurses may follow up their present studies by referring to the larger text-books on the subject when necessary.

Notes on the Common Types of Drug

The following are the chief types of drugs grouped according to their action on the human body. The mental nurse may have to deal with many special drugs which are not mentioned here, but these are discussed as necessary in later parts of this work. Meanwhile it will be understood that only a brief summary can be given in the paragraphs below.

Laxatives.—Laxatives are agents which cause an easy evacuation of the rectum.

Examples.—Whole-meal bread, especially that made from rye; stewed fruit; vegetables; syrup of figs; liquid paraffin.

Purgatives.—A purgative is stronger than a laxative; it vigorously clears out the lower bowel. The action may be brought about through the liver, the bowel wall, or the mucus glands.

Examples.—Castor oil; cascara sagrada; colocynth and hyoscyamus pill.

Cathartics.—Any medicine known to cause an evacuation of the lower bowel is called an aperient, and the two above-mentioned together with the cathartics and salines make up the group. Cathartics are very strong, and are given only in extreme cases.

Examples.—Croton oil; calomel; jalap; grey powder.

Salines.—Probably the cheapest and most-used remedies, the *salines*, appear in our homes under various guises as "health salts." Their action is to cause an easy watery evacuation.

Examples.—Magnesium sulphate (Epsom Salts); sodium sulphate (Glauber's Salt); sodium and potassium tartrate (Rochelle Salt); Seidlitz Powder.

Expectorants.—Acting by way of the stomach, the nerves, or the bronchial glands, expectorants cause a clearance of the air-passages, and are therefore used much in bronchitis, etc.

Examples.—Ammonium carbonate; camphor; tincture of ipecacuanha; paregoric; potassium iodide; tincture of squills.

Antipyretics.—These drugs reduce fever.

Examples.—Phenazone; phenacetin; aspirin.

Sedatives.—Sedatives may act in several ways—on the stomach, intestines, or nerves. Those which act on the alimentary canal include examples such as *bismuth carbonate; belladonna; opium; sodium bicarbonate; lime-water*. The mental nurse must understand a good deal about *nerve sedatives*, which act centrally and so soothe the whole system.

Examples.—Bromide salts; chloral hydrate; morphia; codeine; heroin; hyoscine; veronal; trional; dial; many others belonging to the group known as the *barbiturates*.

Hypnotics.—Sleep-producing drugs should not be resorted to unless all other remedies have failed. In a mental hospital, hypnotics are often inevitable, especially in acute and serious cases.

Examples.—Most of the sedatives in big doses; luminal sodium; allonal; pernocton; nembutal; sulphonal; paraldehyde.

Narcotics.—The most powerful remedies for mania, etc. A narcotic may take the form of a hypnotic given in massive dose by doctor's orders.

Examples.—Opium; morphine; aconite; general anæsthetics such as chloroform, ether, ethyl chloride, avertin, etc.

Anthelmintics.—For the treatment of intestinal worms. (*Male fern; santonin.*)

Cardiac Drugs.—Heart stimulants. (*Digitalis and its allies; strophanthus; quinidine.*)

Diuretics.—Increase the flow of urine. (*Potassium acetate; diuretin; buchu; juniper.*)

Diaphoretics.—Cause increased perspiration. Used in nephritis, etc. (*Ammonium citrate; sweet spirit of nitre; Dover's powder; pilocarpine.*)

Many other forms of drug, and especially groups such as the antiseptics, the endocrine agents, and the hypodermic injections are especially considered elsewhere in this work. The above will give the nurse a fair working knowledge of the drugs she is likely to handle.

Drug Tolerance

It should always be borne in mind that there may be an individual peculiarity towards a certain drug. Some people are said to be *intolerant* of such and such a drug. At the opposite end of the scale are those insensitive persons who may have such a great *tolerance* that massive doses have apparently small effect. In the latter case, especially when powerful drugs are involved, there is a danger of the formation of a drug habit. The sensitive beings who react alarmingly to small doses are much more easily dealt with than those who are unmoved by an amount which would ordinarily produce serious consequences. Another common danger arises from the accumulation of drugs in the body; although small doses are taken at regular intervals, they may not be eliminated, and after a time, symptoms may develop more or less unexpectedly and seriously, on account of the concentration of the drug in the body. Of such character are the drugs *mercury* and *arsenic.* Whenever a drug is in such strength or amount in the body that it endangers life, it is said to be a *poison.* Many drugs are poisons even in minute quantity.

Weights and Measures

Two systems of weights and measures are in use—the Imperial and the Metric. In the United Kingdom both of these are used, but for the present only the main aspects of the Imperial system will be considered. Additional data are given in the Appendix at the end of Volume III. The standards of all weights and measures are as laid down in the Weights and Measures Act.

The Imperial System.—*Avoirdupois Weight.*—The unit of mass is the grain (*granum*), which is the smallest weight convenient for ordinary use. 437·5 grains = 1 ounce (*uncia*), the symbol of which is "oz." 16 ounces = 1 pound (7,000 grains), represented by the symbol "℔," a contraction of the Latin word *librum.*

Capacity.—The unit of volume or capacity is the minim, the symbol of which is "min." 60 minims = 1 fluid drachm (fl. dr.). 8 fluid drachms (480 minims) = 1 fluid ounce, which is represented as "fl. oz." 20 fluid ounces = 1 pint (*octarium*), the

symbol of which is "O." 8 pints = 1 gallon, represented in short by the letter "C" (*congius*).

Notes.—Many of the former signs and symbols have been abandoned, and the intention of the *British Pharmacopœia* is to make the weights and measures as simple as possible. The old apothecaries' weight is not used much in this country nowadays, as it is very confusing, the ounce being equivalent to 480 grains. The scruple, ℈, which is one-third of a drachm, or 20 grains, is very seldom used, and the drachm, which is equal to 60 grains and which has the symbol ʒ, is rapidly going out of use, but many doctors still employ it.

Similarly, the symbols ♏ for the minim and the ʒ for the fluid drachm, also ℥ for the fluid ounce, are commonly found in prescriptions, but they are not official. In many cases ʒj and ℥j are used to represent avoirdupois weight as 60 grains and 1 ounce respectively, but while medical men are constantly advised not to employ these symbols, the nurse must be prepared to encounter them very often in the course of both hospital and private practice.

Comparison between Weights and Measures.—Water is used as the standard liquid in the assessment of all weights and measures. 1 minim is the measure of 0·911 grains of water at a temperature of 62° F. Thus, 100 grains of water at this temperature would measure about 110 minims. As the temperature used is the normal temperature of a comfortable room, it follows that in doing ordinary dispensing the factor of temperature can be neglected; therefore, a 1 per cent. solution of any drug would be made by taking 110 minims of water and dissolving 1 grain of the substance in it. The "percentage" of mixtures may mean a comparison of weight to weight, of weight to volume, or of volume to volumes.

Common Household Measures.—In general practice, the doctor writes on the prescription the accurate amount of medicine which is to be given to the patient. The druggist, therefore, in writing the instructions on the label, translates the signature of the doctor into language which is easily understood by the patient. Since spoons, wineglasses, tumblers, cups, etc., are the common domestic utensils, the doses of medicines are usually expressed in teaspoonfuls, dessertspoonfuls, wineglassfuls, etc.; unfortunately, as is known to all general practitioners of experience, the size of the teaspoon and of all other domestic utensils is one of the most variable things in the world, and therefore a teaspoonful in one household may be equivalent to a dessertspoonful in another. So far as the nurse is concerned, whether she be in hospital or in private practice, she must make a point of always using the standard glass measure, which can be purchased either in a surgical instrument maker's or at a drug store.

Domestic Equivalents.—As a general rule, the following are the domestic equivalents of the official measures, but as stated above, there is no standardization:

1 minim	= 1 drop (roughly)
1 fl. dr.	= 1 large teaspoonful
2 fl. dr.	= 1 dessertspoonful
4 fl. dr. or ½ oz.	= 1 tablespoonful (represented on prescription by ℥ss.)
2 fl. oz.	= 1 wineglassful
5 fl. oz.	= 1 teacupful
8 fl. oz.	= 1 breakfastcupful
11 fl. oz.	= 1 tumblerful

It should be noted that the terms *s.* and *ss.* are used frequently as representing "one-half"; for instance, ℥ii ss. represents 2½ oz.

The Prescription

In hospitals there is invariably a dispensary which is presided over by a qualified dispenser, who has assistants, and in this department all the drugs for the hospital are stored, and many mixtures, lotions, and preparations are made up. It is customary to send out to each ward various types and sizes of containers, filled with the special medicines, general medicines, and the lotions and other solutions used in ward routine.

It sometimes happens that the physician or surgeon of the ward may choose to write his own prescriptions in a book specially kept for the purpose in the ward, and, as every nurse ought to know what these prescriptions mean, a detailed description of the formulas used must now be considered.

No matter whether the doctors' prescriptions be entered in the ward book or whether they be written on the familiar piece of paper which is taken to the chemist by patients treated in private practice, the method of writing out a prescription is established by long years of custom. Properly speaking, all prescriptions should be written in Latin and in full. The reason for this is not to keep from the patient the knowledge of what is being given to cure his ailment (the modern man in the street is too sophisticated for that), nor is it to add any air of mystery to the treatment, but since a prescription may be utilized all over the world (for example, by travellers), Latin is a language which is understood by all dispensing chemists, and therefore it has remained the official language on all prescriptions.

The Form of the Prescription.—Generally speaking, the prescription begins with the writing of the symbol ℞ at the top of the paper towards the left-hand margin. This is called the *superscription* and is a shortening of the Latin word *recipe* or

"take." A little lower down, and still farther from the left-hand margin, is written the *inscription*, which is a list of the various drugs used in the mixture, pill, or powder, as the case may be. Each drug is given a separate line, and the genitive case is used, as it is governed by the word *recipe*; the exception is the vehicle in which the drugs are contained; this is written in the accusative case.

There is a definite order of putting down these drugs. The first drug on the list is usually the most important and the most active agent. This is called the *basis*. Usually the second drug, sometimes the third as well, assists the action of the *basis* and is called the *adjuvans*. Next comes the *corrigens* or "corrector" of the action, and finally, the "excipient," which is also known as the *constituens*—something which flavours the mixture and makes it more palatable.

The third part of the prescription concerns the directions which are given to the dispenser and is known as the *subscription*, written immediately below the inscription. It ought to be in Latin, although nowadays it is becoming quite common, especially in America and France, to write the subscription in the language of the country.

The *signature* is the name given to the fourth portion of the prescription, and deals with the directions to the patient. The term actually used is the Latin word *signetur*, which means "let it be labelled." When the dispenser makes up the mixture or other preparation, he writes a translation of the signature on the label and affixes the latter to the bottle.

Many doctors still continue to use Latin as the language of the signature, but this should properly be written in English where English is the prevailing language.

Finally, the prescription is concluded by the addition of the initials or name of the doctor who has written the prescription, these being put at the right-hand bottom corner, while the patient's name is affixed at the left-hand bottom corner, with the date immediately below it.

A Typical Prescription.—

℞

Ammonii carbonatis	gr. xl (Basis)
Tincturæ scillæ	fl. dr. ij. (Adjuvans)
Syrupi tolutani	fl. oz. j. (Corrigens)
Infusum senegæ	ad. fl. oz. vj. (Excipient)
	Fiat mistura

Signetur,

One tablespoonful to be taken three times a day after meals.

Mr. John Brown.

17.10.38. X. Y. Z.

If this prescription were abbreviated, as prescriptions frequently are, it might be written as follows:

℞

Ammon. carb.	gr. xl.
Tinct. scill.	fl. dr. ij.
Syr. tolut.	fl. oz. j.
Infus. seneg.	ad. fl. oz. vj.
	F.M.

Sig.

One tablespoonful to be taken three times a day after meals.

Mr. John Brown.

17.10.38. X. Y. Z.

Common Abbreviations in Prescriptions

It must be confessed that very few doctors are immaculate in the writing of prescriptions, and as it is a well-known fact that doctors' writing is frequently almost illegible, the nurse must be prepared to decipher many mysterious hieroglyphics. Druggists and dispensers, and all those accustomed to reading abbreviations on ordinary prescriptions, soon become used to the contractions and symbols employed by the medical profession in general; a nurse, after careful study of the common abbreviations, may find that she is equally expert. The following is an alphabetical list of the terms likely to be found on prescriptions given either for a hospital patient or for one treated in general practice:

āā.	Ana	of each
A.C.	Ante cibos	before meals
Ad.	Adde	add
Ad lib.	Ad libitum	according to the desire
Æq.	Æquales	equal
Alter. dieb.	Alternis diebus	every other day
Alter. hor.	Alternis horis	every other hour
Amb.	Ambo	both
Aq.	Aqua	water
Aq. bull.	Aqua bulliens	boiling water
Aq. dest.	Aqua destillata	distilled water
B.d. or B.i.d.	Bis in die	twice a day
Bis hor.	Bis horâ	every half-hour
c̄	cum	with
Cap.	Capiat	let him take
Cat. lin.	Cataplasma lini	linseed poultice
Cat. sinap.	Cataplasma sinapis	mustard poultice
C.cm. or c.c.	——	cubic centimetre
C.m.	Cras mane	to-morrow morning
C.n.	Cras nocte	to-morrow night
Co.	Compositus	compound
Cochl.	Cochleare	spoonful
Cochl. ampl.	Cochleare amplum	tablespoonful
Cochl. infant.	Cochleare infantis	teaspoonful
Cochl. mag.	Cochleare magnum	tablespoonful
Cochl. mod.	Cochleare modicum	dessertspoonful
Cochl. parv.	Cochleare parvum	teaspoonful
Collut.	Collutorium	mouth-wash

Collyr. . .	Collyrium	eye-wash
Conf. . .	Confectio	confection
Cyath. .	Cyathus	glassful
Cyath. vinos.	Cyathus vinosus	wineglassful
d. . .	Da.	give
Dil. . .	Dilutus	dilute
Dim. . .	Dimidius	one-half
Div. . .	Divide	divide
Emp. . .	Emplastrum	plaster
Ex. aq. .	Ex aqua	in water
Exhib. . .	Exhibeatur	let it be given
Ft. . .	Fiat	let it be made
Ft. hst. .	Fiat haustus	make a draught
Ft. mist. .	Fiat mistura	make a mixture
Ft. pil. .	Fiat pilula	make a pill
Fort. . .	Fortis	strong
Fot. . .	Fotus	fomentation
Garg. . .	Gargarisma	gargle
Gutt., gtt. .	Gutta	a drop
H.n. . .	Hac nocte	to-night
Hod. . .	Hodie	to-day
Hor. decub. .	Horâ decubitus	at bed-time
H.s. . .	Horâ somni	at bed-time
I.c. . .	Inter cibos	between meals
Lat. dol. .	Lateri dolenti	to the painful side
Lin. . .	Linimentum	liniment
Linct. . .	Linctus	a linctus
Liq. . .	Liquor	solution
Lot. . .	Lotio	lotion
M. & n. .	Mane et nocte	morning and night
M. prim. .	Mane primo	early in the morning
Mist. . .	Mistura	mixture
Mit. . .	Mitte	send
Ol. . .	Oleum	oil
O.m. . .	Omni mane	every morning
Omn. bih. .	Omni bihorâ	every two hours
Omn. hor. .	Omni horâ	every hour
O.n. . .	Omni nocte	every night
P.c. . .	Post cibos	after meals
P. prand. .	Post prandium	after dinner
P.r.n. . .	Pro re natâ	occasionally; when required
Pulv. . .	Pulvis	powder
Q.d.s. . .	Quater die sumendum	four times a day
Qq. . .	Quaque	every
Q.q.h. . .	Quarta quaque horâ	every four hours
Q.s. . .	Quantum sufficit	sufficient quantity
Quart. hor. .	Quarta horâ	every four hours
Rep. . .	Repetatur	let it be repeated
S.o.s. . .	Si opus sit	if necessary
Ss. . .	Semisse	one-half
Stat., st. .	Statim	immediately
Sum. . .	Sumendum	let it be taken
S.V.G. . .	Spiritus vini gallici	brandy
S.V.R. . .	Spiritus vini rectificatus	alcohol
T.d., T.i.d., T.d.s.	Ter in die (sumendum)	three times a day
Ung. . .	Unguentum	ointment
Vap. . .	Vapor	inhalation

CHAPTER 7

ADMINISTRATION OF DRUGS

ORAL METHODS. INHALATIONS. THE USE OF THE INHALER. OXYGEN INHALATION. CARBONIC ACID GAS INHALATION. INUNCTION. HYPODERMIC INJECTION. HOW TO GIVE A HYPODERMIC INJECTION. CARE OF SYRINGES. INTRAMUSCULAR INJECTION. INTRAVENOUS INJECTION. PRECAUTIONS IN GIVING HYPODERMIC INJECTIONS. OTHER METHODS. BY THE RECTUM. BY IONIZATION. BY INSUFFLATION. HOW AND WHEN TO GIVE DRUGS. VACCINES.

THERE are certain general rules which apply to the giving of drugs. In a ward, the doctor orders the medicine on a prescription form, and the preparation is delivered from the dispensary, as already mentioned; in private practice, the local druggist makes up the mixture or other remedy. In both cases the preparation is in the charge of the nurse, who in private practice must make her own arrangements for safe keeping of the drugs used. So far as the hospital is concerned, it is customary to have a medicine cupboard in one of the side-rooms, and the key of this cupboard must be kept by a senior nurse. Even ordinary lotions ought to be "issued," as on many occasions simple mistakes have been made, for example, in the giving of phenol instead of castor oil, with fatal effect. *Poisons should be kept in a special cupboard.* All poisonous fluids are marked with red labels on which is clearly printed the word POISON, and often "NOT TO BE TAKEN." The bottles are coloured green, dark blue, or deep amber, and are frequently of hexagonal shape. If a poison thus advertised is given in error, it is essentially not the fault of the dispenser. But the nurse should never take risks; it is the apparently impossible that often happens. A strict routine should therefore be observed at all

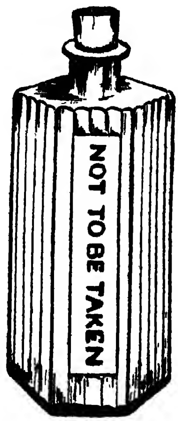


FIG. 68.—BOTTLE FOR CONTAINING POISONS.

times. The label should be carefully read, so that the name of the patient and the dose of the drug are checked. The correct way to measure out a quantity of a mixture is to hold the graduated glass in the left thumb and first two fingers, at the level of the eye, and to pour carefully until the lower level of the fluid (meniscus) is in line with the required index. After carefully measuring the poured-out dose, the nurse should once more check her work with the writing on the label. All medicines must

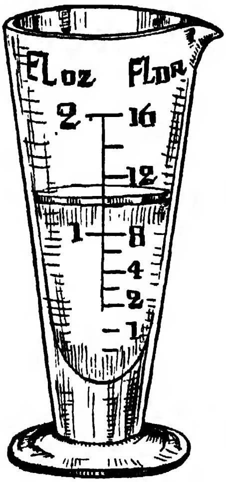


Fig. 69.—Measuring Glass (2 fluid oz.)

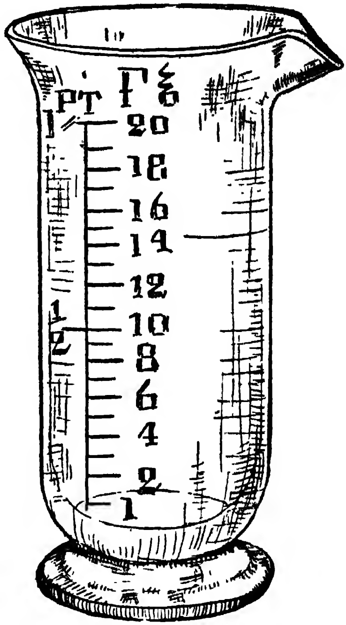


Fig. 70.—Measuring Glass (1 pint).

be poured out with the label of the bottle uppermost; this avoids obliteration of the directions on the label by drops, stains, etc. Before giving a dose to a patient, the nurse should get another nurse to check the amount; this is especially important when large doses are ordered. The system of sending two nurses round the ward with the medicines on a tray is to be commended, but in a refractory ward of a mental hospital this procedure is impossible. A good supply of measuring glasses and a jug of water for dilution purposes are necessary; there should also be an enamel basin containing water for rinsing the glasses. A towel for drying, and a spoon or glass rod for stirring, if necessary,

complete the equipment. One nurse checks the doses and sees to the cleansing of the glasses; the other supervises the giving of the medicines.

Drugs should be given at the right time, not ten minutes before, or ten minutes after, the proper hour. The effect of the drug should be noted; most patients dislike medicines, however elegantly they have been compounded, and it is not enough to observe how the patient criticizes his dose. What is important is the careful record of the *signs* noticed afterwards. Many people have peculiarities towards certain remedies, such as potassium iodide, sodium salicylate, etc., and increase of pulse, rash, running of the nose, etc., must be carefully watched for.

Immediately after the nurse has done her "medicine-round," she should see that all the drugs are again checked, and put safely away. More is said about this subject in Section V. Drugs should never be left near patients.

There are various standard ways of giving drugs; these are described in order below.

Oral Methods

The commonest way to give a drug or drugs is to dispense certain fluids or solids together, in a *mixture*. The dose is swallowed, passes from the stomach to the intestines, and there is absorbed by the villi and so goes to the portal vein; ultimately the blood takes it to the organ it is supposed to influence. There are other ways of giving drugs by the mouth: *pills*, *powders*, *cachets*, *capsules*, *tablets*, etc., are very commonly substituted nowadays; in fact, it would seem that the days of the old-fashioned "bottle" are passing. Nevertheless, a great deal of internal medication is carried out by using mixtures.

Pills, on account of their minute bulk, have the advantage of being more easily swallowed than the average dose of a mixture. But many people have great difficulty in taking pills, and often the latter have to be incorporated in a bolus of bread. It is usual to coat pills with sugar, but in some cases this method prevents the breaking up of the pill at the right time, and many doctors prescribe pills as "uncoated." On the other hand, it may be necessary to delay the effect of the drug until it reaches a certain part of the bowel, in which case it is customary to coat the pill with a substance which resists the gastric juices, but which is digested by the *succus entericus*. Pills are very often used for their purgative effect.

Powders are usually small, and are not difficult to take, apart from their taste. They are easily washed down by a mouthful of water.

Cachets and *capsules* are made of rice paper or gelatine, so that

their contents can be liberated by the action of the gastric juice which dissolves the envelope. The various *tablets* on sale nowadays are an indication of their popularity; a stage has been reached at which competition is very keen amongst drug manufacturers and refiners to produce ingredients of the purest type; therefore it is certain that the public has a supply which is at its best. There are many other ingenious ways of introducing drugs to the alimentary canal, and the nurse by experience learns many easy methods of making nauseating drugs less offensive to the patient.

Inhalations

Inhalation is used when a very speedy action is desired, as in the spasms of asthma, or in the sudden constriction of the fine arteries in certain circulatory diseases. Gases may also be used as stimulating inhalants, e.g. oxygen and carbonic acid gas.

There are two types of apparatus for giving vapour inhalations: (*a*) the inhaler; (*b*) the steam-kettle.

The Use of the Inhaler.—Certain methods of inhalation depend upon the intake, with every inspiration, of a definite amount of a drug, which is very finely distributed in hot vapour. When this specially treated vapour reaches the alveoli, it is spread out on the surface of the small chambers, and is thus easily absorbed by the blood. Inhalations are therefore useful in all bronchial conditions, especially where there is congestion of the fine bronchioles. The method of inhalation is also used largely in inflammations, and in catarrhal conditions of the upper parts of the respiratory tract, e.g. in inflammation of the larynx, in ordinary sore throat, in diphtheria, in croup, and in all irritations due to microbes. Inhalation is not only soothing to the patient, but it is also a very suitable way of producing the maximum effect of the drug over a given area. There are two methods of giving inhalation treatment—the *moist* method and the *dry* method.

FIG. 71.—NELSON'S INHALER.

The Moist Method.—The commonest and most popular method of giving an inhalation is by using *Nelson's inhaler*. As shown in the illustration, this consists of a fairly stout, glazed earthenware pot, fitted with a cork, through which a glass tube protrudes. To make the inhalation mixture, a pint of water at a temperature of about 150° F. is poured into the jar, and to it is

added one of the well-known inhalants, the commonest of which is Friar's Balsam, but crystals of menthol, oil of eucalyptus or of pine are occasionally employed. Great care must be taken that boiling water is not used, as the steam may scald the mouth of the patient. It is advisable to make the container not more than half full, and to ensure that the glass tube protrudes for about half an inch only through the cork into the jug. The nurse must ascertain, before giving the patient the inhaler, that the solution is not too hot, and that there is no possibility of drawing any fluid into the buccal cavity when the glass tube is placed in the mouth. In order to maintain the temperature as long as possible, it is customary to wrap up the inhaler in thick flannel or in several layers of towel, so that only the glass mouthpiece is exposed to the air. The treatment can be applied every hour if necessary in acute cases, and it brings great relief, the patient absorbing a considerable quantity of the drug with each inspiration, and therefore counteracting the effects of the disease. Each inhalation should last about ten minutes.

Another method popular in private practice, and well known as a homely remedy for sore throat, laryngitis, and tonsillitis, is the use of a moderately sized enamelled jug, into which boiling water is placed, with a certain quantity of the drug to be inhaled. The steam rises up very copiously, but it cools very quickly, and the inhalation is carried out by the patient holding his head, with his mouth wide open, about a foot above the enamelled basin, while a towel is draped all round his head and round the edge of the basin. In this way the patient's head is enclosed in a sort of miniature tent, and the fumes pass both by the mouth and by the nostrils.

A more elaborate method is employed in hospitals, especially when serious cases are being treated. The *steam-kettle and tent* are sometimes used in bad cases of bronchitis or other lung troubles of children. The aim of those prescribing this treatment is to create a constant atmosphere charged with curative drugs, so that the patient, who is enclosed in the tent, breathes medicated air continuously. In some cases pure steam is used when the effect of the warmed air only is required. Usually every large hospital has a special tent-frame, which fits over the head of the bed, but in some cases the child's cot is converted by fixing poles at the four corners and draping sheets over the framework so formed. At one side an opening is made, through which the long spout of a kettle is placed. It is possible to improvise a tent by using screens over which sheets are hung. In all cases of employment of this method, care should be taken that the bed is well protected from draughts, which naturally would soon cool the atmosphere.

The steam-kettle which supplies the vapour should be set at

one side of the bed. Electricity or spirit may be used for heating the kettle. The former method is modern, and presents little or no difficulty, but the latter, which is the old-fashioned method, demands certain precautions.

In the first place, the kettle must be far enough away from the bed to obviate all possibility of the bed-clothes catching fire. Secondly, it must be anticipated that there is a danger of the spirit-lamp leaking or bursting. The approved method of setting up the spirit-lamp and kettle is one which stipulates that an old enamelled basin or other metal container should be put

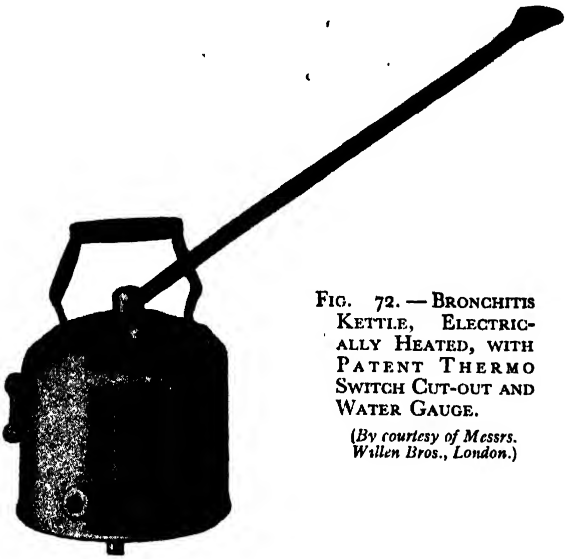


Fig. 72.—Bronchitis Kettle, Electrically Heated, with Patent Thermo Switch Cut-out and Water Gauge.

(By courtesy of Messrs. Willen Bros., London.)

on a chair or stool about the height of the bed; the spirit-lamp is placed on the container and stands in sand. It is also advisable to have a bucket of sand handy in case the fire should spread. The tent is so arranged that the spout of the inhalation kettle passes through an opening, which should preferably be on the side farthest away from the door or window. It should also be ensured that there is no possibility of the patient being able to touch the tip of the spout, and that the spout is not in such a position that the fumes will scald the patient in any part of the body. Provision should further be made that there is not too much condensation of the steam. Since there is usually a steady drip from the spout of the kettle, it is advisable to make some arrangement to catch the water as it falls. The temperature inside the tent should never exceed 75° F. The nurse in charge of

the steam-kettle should see that it is regularly replenished; to begin with, it should never be more than half filled, and it should be made up with fresh boiling water or a solution of Friar's Balsam, or whatever has been ordered by the physician, at least every two hours. This is really a matter for constant watching and adjustment. What must be maintained is a regular and evenly distributed supply of moisture, at a steady temperature; therefore, a good nurse should always keep an eye on the steam-kettle, making sure that it does not evaporate to dryness, or that it does not splutter, and thus sprinkle boiling water on the patient.

The Dry Method.—No steam is used in this method. The drug, which may consist of creosote, chloroform, ether, amyl nitrite, etc., can be placed on a gauze pad or on an anæsthetic mask, which, when fixed over the patient's mouth and nose, allows the drug to be inhaled with each inspiration. The Burney-Yeo inhaler has a sponge which is saturated with the drug to be inhaled, and in this way the whole of the drug is absorbed in about a quarter of an hour, but great care is necessary in using it, as the mask is so closely applied to the skin that strong drugs which are spilt outside the sponge may damage the face of the patient. In any case it is always compulsory to apply fine paraffin or lanoline to the area of the face in contact with the mask. In giving amyl nitrite, which is used for all conditions of high blood-pressure or of angina pectoris, a special method is employed. The drug is generally made up in thin glass phials, which are surrounded by thick lint or cotton-wool pads, and when the glass is broken by tapping it sharply, or by crushing it with the fingers, the fluid flows out and the fumes quickly rise. The approved method of giving this drug to patients is to put one of the capsules in a handkerchief and then to break the glass. The handkerchief and its contents are then applied to the patient's mouth and nose until he recovers.

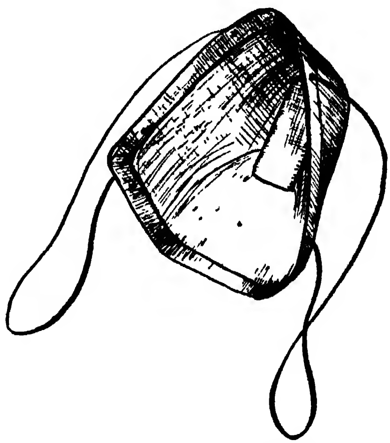


FIG. 73.—BURNEY-YEO'S RESPIRATOR.

Oxygen Inhalation.—In all hospitals oxygen is available as a stimulant for severe cases of collapse, whether it be the result of a serious operation, of bleeding, of shock, or of cardiac failure.

Oxygen is also very useful in the acute stages of pneumonia, when, owing to the inflammation of the lung, the normal supply of the gas in the air is difficult to absorb.

Oxygen is kept under pressure in cylinders; these can be

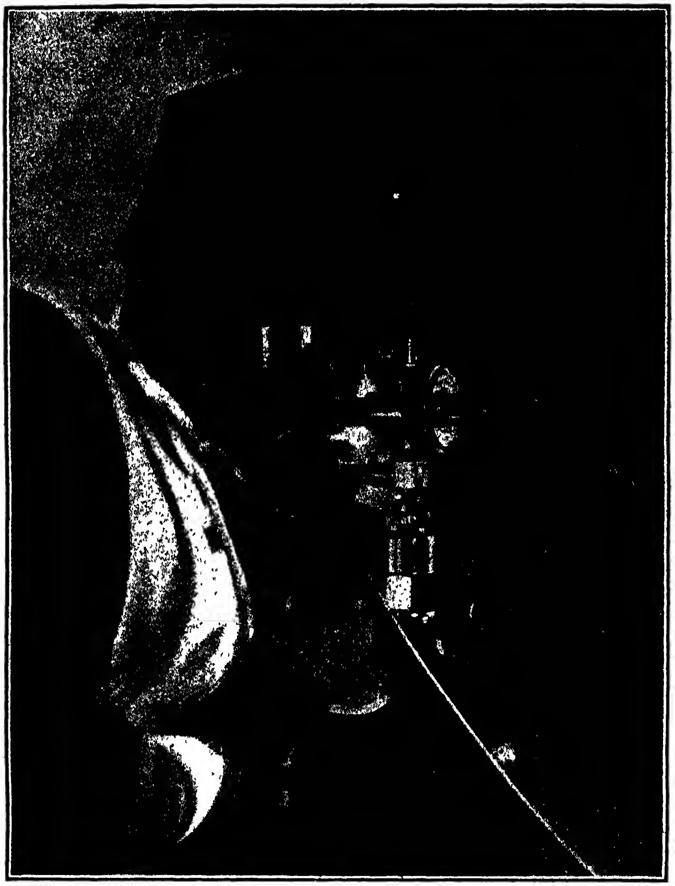


FIG. 74.—SHOWING METHOD OF CONTROLLING OXYGEN FROM A CYLINDER.
(By courtesy of the British Oxygen Co., Ltd., London.)

obtained much more easily nowadays than formerly. Most druggists stock small cylinders, for use in private houses or for emergencies and accidents. No up-to-date operation theatre is complete without a cylinder of oxygen, which should be tested every day and kept handy for the anæsthetist as a remedy in the event of the collapse of the patient whilst under the anæsthetic.

If oxygen were given straight from the cylinder, it would have a very drying effect on the mucous membranes. To counteract this, it is customary to give oxygen which has been moistened and warmed, by passing it first through a Woulfe's bottle (see picture), which should be half full of hot water or warm brandy, the latter acting as a stimulant as well as a heating agency. In cases of great emergency, when there is no time to fix a Woulfe's bottle, oxygen must be given straight from the cylinder by rubber tube, and a certain amount of risk must be taken regarding the dose.

Precautions to be Adopted.—There are various important matters which must always remain uppermost in the mind of the nurse who is in charge of the oxygen apparatus. First, the cylinder should be carefully kept in its stand, and it should be out of the way of those who pass and repass it.

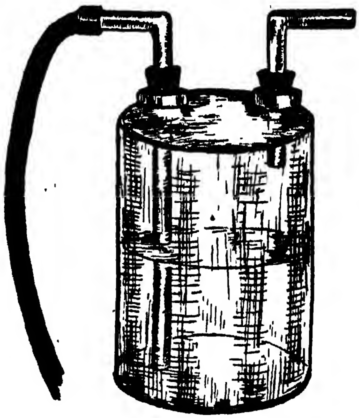


Fig. 75.—Woulfe's Bottle.

On no account should any experiments be tried with the mechanism by unqualified people, and the cylinder and all its appliances should be kept free from any form of oil or grease. At the top of the cylinder are gauges and valves, which indicate the amount of oxygen passing through. The key of the oxygen cylinder should either be left in position or tied to the side of the stand. Before giving oxygen to a patient, the nurse should test everything for herself in another room. Then when the time comes for the oxygen to be administered, there is no preliminary fuss and the patient is not unduly upset.

When oxygen is given, with or without the Woulfe's bottle, the cylinder is attached to a piece of rubber tubing by a corrugated nipple at the top, and the gas can be administered to the patient either by fixing a small glass tube to the other end of the rubber tubing and passing it up one nostril, or by putting the end of the rubber tubing into the patient's mouth, or by fixing a funnel to the end of the rubber tubing and placing it over the mouth and nose, or by using a special apparatus (e.g. Haldane's apparatus), which allows the supply of oxygen to be carefully regulated.

The chief test, which must be carried out before the oxygen is given to the patient, is one in which, as a preliminary, the gas is turned slowly on and the bubbling in the Woulfe's bottle is

carefully watched. The nurse should satisfy herself that there is just the right amount of gas passing through, and the usual standard is one which permits the bubbles to come so quickly through the tube in the bottle that they are just past the stage at which they can be counted. Generally it is sufficient to give oxygen for about ten minutes, then allow half an hour's rest, but the administration may last for ten minutes, with ten minutes' break, and then a further ten minutes of oxygen, and so on, as ordered by the physician. The nurse should

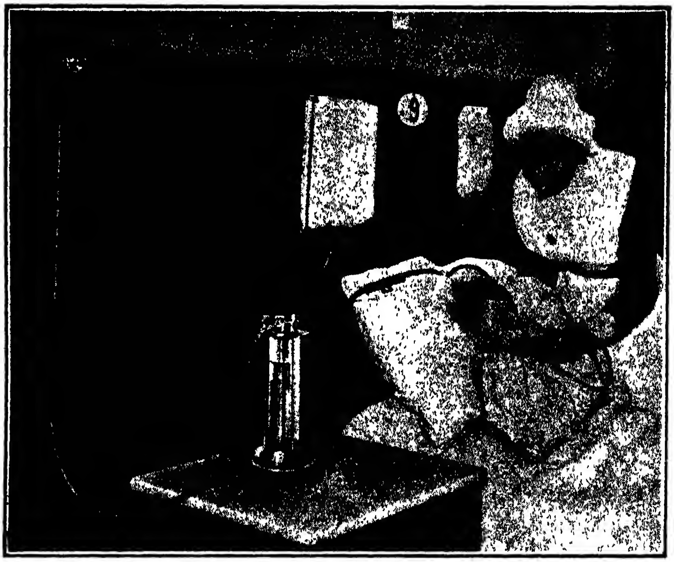


FIG. 76.—ADMINISTRATION OF OXYGEN BY THE FLOWMETER AND HUMIDIFIER METHOD.

(By courtesy of the British Oxygen Co., Ltd., London.)

see that the greatest care is taken in the fitting of masks, in holding funnels to the mouth, and in passing the tubes through the nostril. It must be remembered that patients are often frightened of this procedure, and that they do not relish the idea of being "choked" with an apparatus over the mouth and nostrils.

In giving oxygen by the funnel method, the funnel should be held about an inch from the nostrils and mouth, and therefore it is a matter of personal supervision on the part of the nurse. It is useless to imagine that this oxygen will reach the lung in any efficient concentration if the funnel is held at any distance from the mouth and nose. In using a catheter, a little anæsthetic

ointment, generally made with cocaine, is applied thinly to the outside of the tube before it is placed in the nostril, and in passing this tube up the nose, the nurse must see that it is very gently done, and that it is not inserted any farther than 3 inches. Sometimes it is possible to tie these catheters by winding a few turns of domette bandage round the forehead or by using adhesive plaster.

The Oxygen Tent.—The most modern form of oxygen inhalation is carried on by means of the oxygen tent, an appliance fitted over the head of the bed and enclosing the upper part of

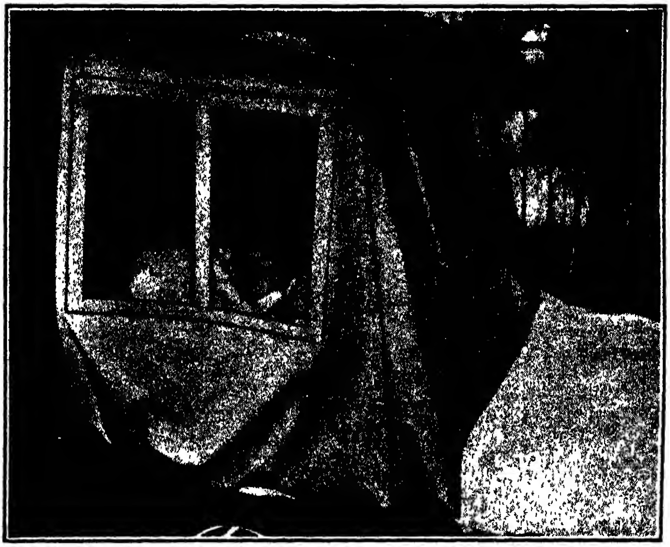


FIG. 77.—A CHILD RECEIVING TREATMENT IN AN OXYGEN TENT.
(*By courtesy of the British Oxygen Co., Ltd., London.*)

the patient's body; this is a very efficient and economical method of administering oxygen. The illustration demonstrates best how the treatment should be accomplished. The best known model is that called the " St. George's Hospital Model." There is also now in operation a service by which such tents may be hired.

Carbonic Acid Gas Inhalation.—It has been proved beyond doubt within recent years that the most successful and most speedy remedy for asphyxia is not oxygen, but carbonic acid gas, because the presence of the latter in excess in the blood stimulates the respiratory centre, and leads to increased effort to take in more oxygen by the lungs. There are various other physiological considerations involved, but all the mental nurse need concern herself about is with regard to the method of giving carbonic acid gas. This now-established remedy for asphyxia

from any cause should always be handy in the ward, and it should be used in conjunction with the physical methods employed in artificial respiration. Various concentrations of carbonic acid gas are used.

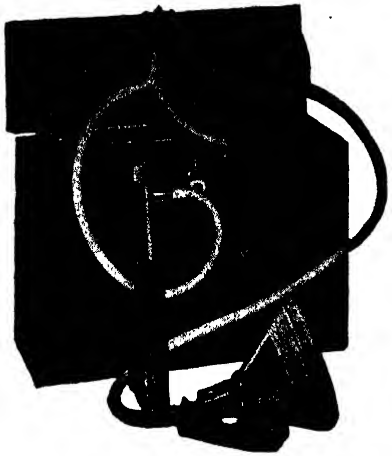


FIG. 78.—THE LATEST TYPE OF CARBONIC ACID GAS RESUSCITATOR.

This is contained in a carrying case with six spare bulbs and allows for the inhalation of 7 per cent. of CO_2 and 93 per cent. of air.

(By courtesy of Sparklets, Ltd., London.)

This method of stimulating the respiratory centres may be used in the asphyxia of new-born babies, in drowning, carbon-monoxide poisoning, morphia and veronal overdoses, alcoholic coma, shock, effects of anæsthesia, asthma, and many other allied conditions.

The most suitable apparatus for giving carbonic acid gas is the " Sparklet " Resuscitator, a simple device consisting of a cylinder of compressed gas with a key which, when turned, liberates the gas. There are various sizes, varying from the pocket size to the size that is accommodated by a carrying case. The gas can be given by the open or closed method. In the latter a known mixture of CO_2 and air is inhaled through a closely fitting face-mask. In the former, the gas passes into the mouth from a tube held about 2 inches away, or through the nostrils, and the face may be covered with a handkerchief. The various procedures are as illustrated in these pages. All nurses should become proficient in handling this apparatus, and more will be learned

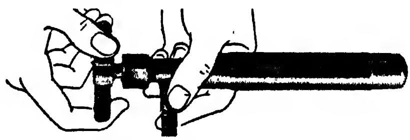


FIG. 79.—OPERATING THE SPARKLET RESUSCITATOR.

(*a*) Screw down the valve key gently to close needle valve.

(By courtesy of Sparklets, Ltd., London.)

FIG. 80.—OPERATING THE SPARKLET RESUSCITATOR.

(*b*) Unscrew and remove the holder.

(By courtesy of Sparklets, Ltd., London.)

from practical experience than from reading descriptions in text-books.

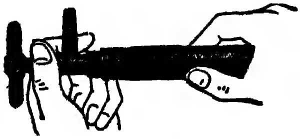


FIG. 81.—OPERATING THE SPARKLET RESUSCITATOR.

(*c*) The bulb having been inserted in the holder, screw down once more as quickly as possible, this operation piercing the bulb containing gas.

(*By courtesy of Sparklets, Ltd., London.*)

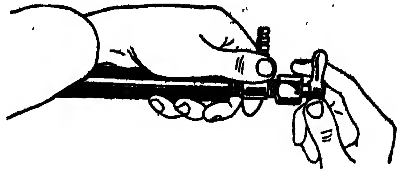


FIG. 82.—OPERATING THE SPARKLET RESUSCITATOR.

(*d*) Holding resuscitator as shown, the key is again turned (anti-clockwise), this regulating the flow of gas from the nozzle. The latter should be held about 2 inches away from the patient's nose and mouth. Always keep the resuscitator upright.

(*By courtesy of Sparklets, Ltd., London.*)

Inunction

For local and general skin diseases, ointments, which consist of a fatty basis containing a certain drug, may be applied and gently rubbed in. Inunction properly means the rubbing into the skin of a certain amount of a drug incorporated in an ointment so that it can pass through to the subcutaneous tissues and be absorbed there. Mercury, a specific for syphilis, is commonly given in this way, and in some cases, cod-liver oil. The danger of mercury is that it may produce signs of *mercurialism*, in which there is ulceration of the mouth and gums with copious salivation. Therefore the nurse must avoid touching the drug herself, either by using rubber gloves, by using a flat glass applicator, or by allowing the patient (assuming he is capable of doing so) to rub the ointment in himself. Naturally the last method does not apply to mental patients. Provided there is no broken skin, the following sites may be used during a week, so that there is no danger of causing permanent irritation: medial side of right arm, right side of abdomen, medial side of right thigh, medial side of left arm, left side of abdomen, medial side of left thigh. The skin should be carefully washed and dried before and after each inunction; the former procedure brings the maximum blood-supply to the area and allows rapid absorption. A patient should be instructed to keep working the tips of the fingers steadily over the area for about half an hour; this ensures that the drug is efficiently absorbed.

Hypodermic Injection

Hypodermic injection is now a much more widely applied term than it was formerly. It may be said to embrace any injection which passes *below the skin,* whether it goes into the cellular tissue immediately under the skin, into the muscle, or into a vein. It is a very quick method of giving powerful drugs which are urgently required in an emergency, e.g. collapse or excessive pain. At one time the *British Pharmacopœia* contained certain approved hypodermic injections of morphia, strychnine, and other drugs; these have been abolished (1932), and now the dose of the drug is made up by adding a certain amount of the remedy to distilled water.

In giving a hypodermic injection into the cellular area under the skin, a special syringe and needle, familiar to all, is used. The all-glass or glass-and-metal syringes are the most useful. The needles, which are rustless and which should always be kept ready for use in the metal box with a stilette in their canals, may be sterilized by boiling with the all-glass syringe, or they may be placed in methylated spirit for five minutes and then heated in a flame. In some cases, the needles are permanently stored in methylated spirit. The all-glass syringe consists of three parts—a *barrel,* a solid glass *piston,* and a *needle-holder* of glass which is ground on its upper circumference so that it fits tightly into the barrel. When the three parts are properly fitted, the piston should just meet the upper surface of the needle holder, and both should meet at the point " O " on the graduated minim or cubic-centimetre scale of the barrel. Before giving a hypodermic injection, the nurse should test the working of the whole apparatus very carefully.

How to Give a Hypodermic Injection.—The usual routine adopted is to boil the dismantled parts of the syringe for a few minutes, together with two needles from which the stilettes have been removed. *Never boil the syringe with the piston inside it.* While the sterilization is going on, a small tray should be prepared, containing small cotton-wool pledgets in 5 per cent. phenol, a small bottle of ether or of methylated spirit, sterile water, the solution from which the injection is to be measured, and a sterilized minim measuring glass. Sometimes a phial of liquor of iodine (mitis) is added to the tray.

After the syringe has been sterilized, the patient's skin, generally at the lateral aspect of the middle of the upper arm, is cleansed with methylated spirit or ether, being rubbed well to ensure that all grease is removed. As an additional precaution, the skin may be swabbed with a 2½ per cent. phenol pledget, and allowed to dry.

The drug to be given may be taken from a bottle already prepared, or it may be necessary to dissolve the tiny tablet in distilled water. For this purpose, a watch-glass, a minim measure (preferably conical), or a teaspoon may be used. After the solid matter has completely dissolved, the injection is ready for the syringe, but in all cases the nurse should have a check made by the sister or nurse in charge, as it ensures her freedom from liability and prevents mistakes. In the case of the solution already made up in bulk, and from which a certain amount has to be withdrawn, it is quite easy to get a check made after the dose has been drawn up into the barrel of the syringe. It must be stressed that all nurses must be quite certain of the correct dose, and in most hospitals the treatment card or case sheet is taken to the sister and initialled each time a dose is given.

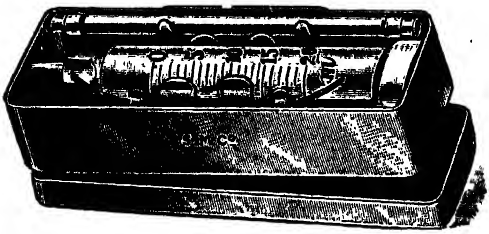


FIG. 83.—THREE-PIECE ALL-GLASS HYPODERMIC SYRINGE IN METAL CASE.

(By courtesy of the Surgical Manufacturing Co., Ltd., London.)

The syringe is now completely ready, but it must be tested. The parts are fitted together, and a needle attached. A barrelful of sterile water is drawn up: it should run freely, bubbling up into the vacuum left by the piston; if it refuses to run, two things are possible—(*a*) a slack piston, (*b*) a choked needle. This is the reason why two needles are usually boiled. To dry and properly sterilize the needle and barrel, a little alcohol, followed by ether, should be drawn up, the piston being well worked backwards and forwards to drive off all the spirit. Some people believe in plunging the needle into a hot flame just before use, and omit certain of the above stages, but the more thorough the preparation the better. Phenol (5 per cent.) may also be used.

There are two ways of putting in the needle. The nurse, whose hands must be carefully sterilized, takes the hypodermic syringe in her left hand, moves the piston slowly upwards until the liquid just appears at the end of the needle, and then transfers the syringe to her right hand, gripping the barrel firmly with the index and middle fingers, and pressing the thumb on the flat-

tened end of the piston. With her left hand, she either pinches up the skin into a ridge, or draws it tightly over the muscle with the thumb and fingers. The needle is inserted boldly as far as it will go; the patient feels a slight prick, but with a properly given hypodermic injection, the pain should be momentary. The nurse slowly presses the piston, maintaining the pressure of the thumb until the whole of the dose has been given, then the needle is slowly withdrawn. Immediately afterwards, the index finger should be over the puncture, while the middle finger strokes the fluid upwards until it is dissolved. Unless this is done, there is a danger of leakage. Finally, the puncture may be swabbed with carbolic, spirit, or iodine liquor (mitis), and a little varnish applied if necessary.

Care of Syringes.—The syringe and needle should now be carefully sterilized and returned to store. The care of syringes is important. The *all-glass* variety has the one disadvantage that it may be broken easily, but if it is remembered to dismantle the parts before boiling, and to put them together only when cool, no accidents will occur. The metal-and-glass type is old-fashioned, but still much in use. The piston and ends are made of metal, the barrel only being of glass, but owing to the fact that the metal expands much more quickly than glass, there is a greater risk of breakage when the expanded metal is forced into the glass barrel. Probably more casualties occur from this than from anything else; the nurse manages to push the plunger and piston in so far, then she finds it sticks, and when she tries a little more force, the glass barrel cracks. In some cases, an adjustable piston of asbestos is provided, the screwing of the piston rod causing a tightening up of the plunger; a loose glass barrel is provided, which can be replaced from a spare stock with the outfit. This is in all respects a most unsatisfactory syringe, leading to many kinds of difficulty. It cannot compare with the all-glass type, which is strongly recommended.

The storage of syringes is simple. Sometimes the needles are kept in alcohol, but the usual practice is to replace the various parts in the special frame of the metal box and to draw a stilette through the needle before putting it in its clip. In certain cases, very cheap needles are provided which can be thrown away after use. The syringe-box is often stored in the poison cupboard. Care should also be taken to replace the stock bottle containing the drug, or the small tube of tablets. These should never be left near the patient.

Intramuscular Injection.—This is a method of introducing a drug deeply into a large muscle, and is employed when heavy fluids like mercury and camphor are given. A larger syringe is used, with correspondingly bigger needle, and it should be long,

sharp, and strong, so that it can be plunged deeply into the buttock or deltoid regions. Massage should be carried out for a few minutes after the dose has been given.

Intravenous Injection.—The procedure may be very difficult when the veins are small. The usual veins chosen are the median cephalic or median basilic veins of the front of the elbow, a tourniquet being put round the upper arm to make the veins bulge as much as possible. This operation is usually done by a doctor. The needle is larger than the hypodermic needle, and after the area has been prepared in the usual way, the point is pressed over the vein and sharply injected; when it is certain that the tip of the needle is in the vein, and not before, the tourniquet is released, and the injection made as usual. Afterwards it is usually necessary to put on a small dressing and bandage. Salvarsan and its allies are given in this way.

Precautions in Giving Hypodermic Injections.—Avoid septic punctures; these may result from too timid use of the needle and infusion of the deeper layers of the *skin* with the dose. Steer clear of veins unless an intravenous injection is being given. Make sure that the needle does not break while it is under the skin. See that the point of the needle is sharp. Clean everything before injecting, and be positive about the accuracy of the dose.

Other Methods

By the Rectum.—In this region, two methods are open to us: the fluid injection, fully described later, and the introduction of the *suppository*. The latter is a cone-shaped portion of cocoa butter, in which is incorporated a certain amount of a drug, usually sedative in type. Since absorption from the rectum is poor, double the oral dose should be given. When the suppository is placed just inside the internal sphincter, it melts, liberating the drug. Lubricated with jelly or vaseline, it is passed more easily. The patient should be kept lying very quietly on the left side for about ten minutes afterwards, the nurse making sure there is no leakage. When suppositories contain drugs which aim at producing an evacuation of the rectal contents, the routine is different; in this case the patient should be made to lie face-downwards for about 15–20 minutes. There is then the greatest chance of the rectal mass being broken up and subsequently passed.

By Ionization.—Zinc salts and iodide are commonly introduced to the tissues by the electrical method of *ionization* or *kataphoresis*. A pad is soaked in a certain solution of the drug, and a current of electricity is passed through it for a certain time; this deposits the *ions* of the drug. It is a method which belongs

to the special branch of *electro-therapeutics*, but some doubts have recently been cast on its value.

By Insufflation.—By using a special *insufflator*, a fine powder is evenly sprayed over a part.

By Vaccines.—Vaccine treatment is part of a great branch of bacteriological therapy. Preparation for vaccine administration is the same as that for hypodermic injection.

How and When to Give Drugs

Most patients object to their medicine; children especially consider medicines as a punishment. In all cases, an attempt should be made to make the dose palatable. The old-fashioned method of giving a sweet after the medicine has been administered is still popular and effective. Castor oil is easily swallowed in hot milk or in orange juice; by these methods the oil is insulated and passes over without nauseating reactions. Paraldehyde may also be suspended in about an ounce of water, and an ounce of plain water should follow it. Most drugs are given after meals, but it is usual to prescribe alkalis about twenty minutes before food, so that they do not interfere with the acid of the digestive juices. Aperients are given often at bedtime, and act first thing the following day. All the common saline purges should be given first thing in the morning, in 6 oz. of water. Some people take a large cup of weak tea about fifteen minutes later, but another glass of plain water is equally effective. Saline purges act immediately after breakfast by producing a copious watery evacuation, the fluid of which has been extracted from the lower bowel; the patient should therefore continue to drink plenty of water for the rest of the day. This is far more important than is realized by most people. Water should always be given to patients, if they want it, either before or after a dose of a mixture, etc., is administered, provided, of course, that there are no medical orders to the contrary.

CHAPTER 8

ASEPSIS AND ANTISEPSIS

SEPSIS. ASEPSIS. LOTIONS. BORACIC ACID LOTION. PHENOL (LATE CARBOLIC ACID) LOTION. LYSOL GROUP. MERCURY PERCHLORIDE. FORMALIN. BINIODIDE OF MERCURY. PERMANGANATE OF POTASH LOTION. METHYLATED SPIRIT. PEROXIDE OF HYDROGEN. NORMAL SALINE. OTHER STOCK LOTIONS. MAKING UP LOTIONS.

It is assumed that the mental nurse is already aware of the general process of infection, of the various types of bacteria, and of the courses and sources of infectious disease; and that she is acquainted with the principles of disinfection, and in general, with the main essentials of germ disease and how it is brought about. In the following pages the subject is further considered.

Sepsis.—The process of sepsis depends primarily on some local weakening of the skin or mucous membrane, which thus allows a mild or massive germ attack to succeed to a varying degree. Sepsis is therefore like any other germ-disease. Its virulence depends upon the power of the microbe and upon the resistance of the individual. A person in a weak state of health may be overcome by an attack of ordinarily conquerable germs, while even the most robust of us may temporarily succumb to a virulent strain of microbe which has obtained the smallest foothold. Each case reacts according to its peculiarities, and thus the problem of sepsis is one which varies in every instance.

If a septic process is in operation, the reaction of inflammation is the result. But when putrefactive germs are present, the poisons they produce may be so strong that there is loss of a small part of the tissue by *sloughing*, with constitutional reaction of high temperature, quick pulse, and all the classical evidences of toxic pyrexia. The ordinary pyogenic germs behave in the manner described above. The local reaction is the formation of a barrier of granulation tissue which restricts the spread of the germs and poisons, and which finally causes *suppuration*, or liquefaction and discharge of the septic matter as *pus*. It may be necessary, in order to reduce the alarming constitutional reaction, to open and drain the local site as well

as to give the usual general treatment which holds good for infectious fever. It must not be forgotten too that even a small chronic area of sepsis (e.g. a carious tooth) may gradually poison the rest of the body, and thus lead to chronic toxæmia.

Asepsis.—Lister's method was to destroy the germ by creating an atmosphere which was saturated with substances known to be poisonous to microbes. Such substances we refer to nowadays as *germicides*, or *antiseptics*. It is admitted that Lister was crude in his system, but it was a great advance in its time, and from the early carbolic spray that permeated the operation-room, and diffused itself through the dressings and the clothing of the operators, and from the universal employment of carbolic acid as an antiseptic lotion for flushing wounds and the dressings over them, there has developed our modern routine of *asepsis*.

Nowadays, we know that there is no need to saturate the air with a disinfectant, but we realize that by *contagion* we may introduce many pyogenic germs to an open surface. In practice, therefore, we eliminate as many germs as we can from the patient, his surroundings, the people actively engaged in the operation, and the instruments and dressings involved in the treatment. Each aspect of the case has to be dealt with on its merits. We have several antiseptic agents, and the idea is to employ the one most suitable to the situation. Thus boiling water or steam is the greatest germ-killer we use; if germs and their spores are left long enough in steam or boiling water, they cannot possibly survive, and the article exposed is said to be *sterilized*, *sterile*, or *aseptic*; in other words, completely free from pyogenic micro-organisms. Steam or water is not always suitable, however. In certain cases, the fabric would be destroyed, and so we have to rely on the *germicides*, *disinfectants*, or *antiseptics*. By a combination of these two methods, we can produce the state of *surgical cleanliness* or *asepsis*. Some antiseptics do not kill the germ, but maintain the latter in a harmless state so long as it is in contact with the particular agent. This is quite satisfactory for certain purposes. It is not necessary to give a full list of the disinfectant agents, but the following lotions are usually stored as stock solutions in the side-room of the ward, where they are kept under lock and key, owing to the fact that most of them are powerful poisons. The strength of the solution varies according to the hospital. Those mentioned below are merely given as examples.

Lotions

1. **Boracic Acid Lotion.**—The strength of this, which is a *saturated solution*, is 16 gr. to the ounce of hot distilled water, preferably kept well stirred until all the acid is dissolved. To

make a quart, it would therefore be necessary to add 640 gr. When the solution is cold, it should be filtered. It is a clear fluid roughly 1 in 25, or 4 per cent. strength. In the ward, it may be diluted with its own bulk of water, after which it is used in many ways for irrigations and for cleansing. It is not a very powerful antiseptic.

2. **Phenol (late Carbolic Acid) Lotion.**—The usual strength is 1 in 20, i.e. 5 per cent. or 1 oz. to 1 pint. In this form, it is a very powerful disinfectant, being used for urine and fæces, bed-pans, urinals, and other ward equipment; it is a preservative and disinfectant for ligatures, sutures, and rubber tubing. As an antiseptic gargle it may be reduced to a strength of 1 per cent. by adding four times the volume of water. For general wound-toilet a 1 in 40 solution or a 1 in 80 solution is used. Care must be taken that carbolic acid is not absorbed through the skin, either by the patient or by the nurse, as it causes serious kidney disorganization. Owing to its clear syrupy appearance, carbolic acid is usually tinted pink.

3. **Lysol Group.**—This includes substances such as izal, cyllin, cresol, creolin, Jeyes' Fluid, etc. Like phenol, they are derived from coal-tar, and they are supplied in 100 per cent. strength. The pure solution may be used to sterilize instruments, but various authorities recommend 50–100 per cent. strengths. A 1 in 80 solution is generally used for disinfection of various utensils, such as bed-pans, urinals, enamel ware, etc. A ½ per cent. solution, or strengths of from one-half to one-quarter teaspoonful to the pint of water, are used for the disinfection of wounds, for douching, and for the hands. Care should be taken not to use lysol in too strong solution for the hands; it is a powerful disinfectant, strong smelling, and cloudy when added to water, and although it is not so toxic as phenol it may cause destruction (dermatitis) of the skin.

4. **Mercury Perchloride.**—This is also known as *corrosive sublimate*, *mercuric chloride*, and its lotion as *lotio hydrargyri perchloridi.* The commonest strength in use is a 1 in 1,000 solution, made by dissolving 8·75 gr. in a pint of distilled water. This gives a ·1 per cent. lotion. It is one of the strongest poisons known. It cannot be used for instruments, as it has a chemical action on the plating, which many nurses discover to their cost at some period of their career; it cannot be used with soaps, unless specially intermixed. But it is a very good disinfectant for the hands, in 1 in 1,000 strength, while the weaker dilutions (from 1 in 2,000 to 1 in 10,000) can be used as irrigating fluids for the vagina, the eye, and certain types of wound. Blue is the usual tint added to distinguish all corrosive-sublimate solutions from others.

5. **Formalin.**—The irritating odour of this lotion is well known. It contains about 40 per cent. of *formaldehyde*, a vapour which is very useful in disinfection, as it is harmless to clothing. A 1 per cent. or 2 per cent. solution may be supplied for the ward, and it can be reduced for various purposes. Thus in 1 per cent. strength it can be used for disinfecting instruments, ligatures, etc., in 5 per cent. strength for sterilizing the hands. A vaginal douche may be used in ·2 per cent. solution. For wounds, etc., much weaker solutions, 1 in 1,000 to 1 in 2,000, should be used. Formalin is commonly employed for the hardening of pathological specimens.

6. **Biniodide of Mercury.**—This substance is very like perchloride of mercury in action. It has also the same strength in solutions supplied to the wards, 1 in 1,000. It is used instead of mercuric chloride because it does not coagulate albumin; it is neither so poisonous nor so destructive to the tissues.

7. **Permanganate of Potash Lotion.**—Popularly known as Condy's Fluid, this lotion is useful in 1 per cent. strength as a disinfectant, but the disadvantage is that it quickly becomes weak. Diluted to 1 in 500 strength, it is a good mouth-wash, or for cleansing the tissues affected by gonorrhœa; in mild cases 1 in 1,000 strength may be used.

8. **Methylated Spirit.**—This solution is usually coloured pink; it consists of alcohol, 95 per cent., wood naphtha, 5 per cent. When water is added to it, it becomes cloudy. It is used for drying barrels of syringes, as an evaporating lotion, and as a hardening lotion for the skin. A little methylated spirit placed in an enamel basin and set alight will ensure that the internal surface is aseptic.

9. **Peroxide of Hydrogen.**—The usual strength is 10 volumes of nascent oxygen, which is given off very easily; therefore the container should be tightly stoppered, and should be stored in a cool, dark place. Diluted with equal quantities of warm water, hydrogen peroxide is useful for cleansing ears before packing with fresh dressings, or for cleaning wounds such as the sockets of recently extracted teeth. A 10 per cent. dilution makes an excellent mouth-wash.

10. **Normal Saline.**—This lotion is very useful in ·9 per cent. strength, since this is the normal sodium chloride concentration in the body. It is used for dressings, irrigations, infusions, and enemas.

11. **Other Stock Lotions.**—Depending upon the hospital or the medical director, there may be many additions to the above list. *Chlorine* is used by most hospitals, but it may appear in various forms, e.g. eusol, ·75 per cent.; chlorinated soda, 5 per

cent., applied hot on dressings; chloramine T, 1 per cent., for gargles and dressings. *Acriflavine* is another favourite, and in 1 in 1,000 solution is also used for dressings. *Red lotion*, containing zinc sulphate and compound tincture of lavender, was at one time a commonly used dressing for ulcers. Very powerful, and widely used nowadays, are the more modern *dettol* lotion and *amphyl*, both of which are excellent germicides. These are made up in many useful forms for application to skin, mucous membranes, or special cavities.

The various antiseptic preparations (tinctures, ointments, paints, etc.), used in the normal routine of the ward, and generally kept in the drug-cupboard as stock, are dealt with in a later chapter.

Making up Lotions.—Most lotions in ward use are represented by percentages; that is to say, ordinary solutions, such as carbolic (phenol) lotion, may be found in several strengths, varying from 1 per cent. to 10 per cent. Knowing that 1 per cent. solution is for all practical purposes 1 grain of a substance dissolved in 110 minims of water, it is a simple matter to make up lotions of various strengths. If a 10 per cent. solution is required, then 10 grains must be added to 110 minims of water, and so on. Solutions may be increased or decreased in strength according to the directions of the sisters in charge of the ward. As a general rule, the stock solutions required in the wards are delivered in a fixed strength. If it is necessary to decrease the strength of the solution, from, say, 10 per cent. to 1 per cent., more water must be added to the concentrated lotion; in this case, 9 times as much as the original amount to make the 10 per cent. solution. In the same way, if we have 8 oz. of a 20 per cent. solution of phenol, and we wish to make a 5 per cent. solution, we must add 3 times the quantity of water present, i.e. 24 oz. The total then becomes 32 oz. and the strength of the carbolic acid is 5 per cent. In making a solution stronger, the weight of the material to be dissolved must be calculated according to the amount of increased strength; for example, if we take a 1 per cent. solution of any drug and wish to make it a 10 per cent. solution, 9 times the original amount of drug used must be added to the existing liquid to bring it up to 10 per cent. strength.

Nurses frequently have to make these calculations in private practice, and it is essential that mistakes do not occur, otherwise grave consequences may result. This is especially important with strong disinfectants and other poisons. There are various formulas which are intended to help the nurse in remembering how to calculate the quantities required of lotions and solutions, but it is better to take each case separately and to work the problem out, as by this method mistakes can be obviated.

CHAPTER 9

THE EXCRETIONS

THE FÆCES. THE ABNORMAL STOOL. OTHER UNNATURAL CONSTITUENTS OF STOOLS. EXAMINATION OF FÆCES. BED-PANS. URINE. ABNORMAL MICTURITION. COLLECTION OF URINE. SAVING A SPECIMEN OF URINE. TESTING OF URINE. QUANTITY. APPEARANCE. ODOUR. REACTION. SPECIFIC GRAVITY. TESTS. ACETONE AND DIACETIC ACID.

Excretion takes place chiefly through the bowel and the bladder, although there is a considerable amount of disposal of waste products through the skin and by the breath. In the following pages only the fæces (or bowel excretions) and the urine (or bladder excretions) are discussed.

The Fæces

Fæces, the name given to the discarded products of digestion, vary according to the individual, to his food, and to his general health.

Normally, the daily stool should amount to about 6 oz. in an adult, and about half that quantity in a young child. If digestion is perfect, there should be no evidence of undigested food, although the latter may be present in some conditions apparently compatible with normal health. An analysis of an ordinary stool shows it to contain quantities of cellulose, mucus, epithelium, some fibrous and elastic tissue, stercobilin, and masses of bacteria in various stages of activity (many of them dead), and also water, which forms the major portion of the stool.

The amount passed per day depends upon the activity of the peristalsis, and upon the quantity of food which is taken. A normal stool may be described as being slightly acid or slightly alkaline, light brown in colour owing to the bile pigment present, solid but yet soft, and preserving the mould of the rectum from which it has been passed. Owing to the large amount of end-products of protein digestion, there is a considerable odour, which is characteristic of these substances.

The Abnormal Stool.—Stools may vary in character, as mentioned below:

Colour.—A clay-coloured or pale yellow stool indicates that there is a deficiency of bile; it is characteristic of all jaundiced conditions. If there is considerable bleeding in the lower part of the small intestine, the stool is reddish-brown or chocolate-coloured. This is typical of a certain stage of enteric fever. When the colour is actually as black as tar, the condition is known as *melæna*, and is always found when there is bleeding high up in the alimentary canal, e.g. in the stomach or duodenum. It must also be remembered that this condition may be the result of swallowing blood from the socket of a recently extracted tooth. Again, certain drugs cause a greyish-brown coloration of varying degrees. Common drugs in this category are bismuth, iron, and senna. The stool may be bright red owing to fresh blood coming from the lower part of the bowel, or it may be very pale yellow, especially in children who are on a milk diet. Green stools result from large doses of calomel, and, as all mothers know, they also indicate alimentary disturbance in infants.

Odour.—If the odour is stronger than usual, it may mean, apart from the effect of purgatives, that there is some disease of the alimentary tract. In ulceration of the bowel, accompanied by melæna, the stools are very offensive. If there is much bacterial fermentation, a sour character is added to the odour.

Shape.—If the stool is not normally spindle-shaped or cylindrical in outline, it may indicate that there is an increased amount of bowel irritation, causing a semi-solid stool. In some cases the stool is passed as a ribbon, which frequently means that there is a condition of internal piles or that some growth is pressing the contents of the rectum; occasionally there is grooving on one side.

Amount.—It is very difficult to assess what is the normal and what is an abnormal amount of the daily evacuation; every individual has a different standard. In feverish conditions most of the fluid which forms the bulk of normal fæces is absorbed, and therefore the stool is very small and hard; the same applies to chronic constipation. The quantity is increased when the peristaltic movements of the bowel are more active, when foreign bodies or "roughage" causes irritation of the bowel wall, or when there is catarrh of the lining of the bowel, due to germs or other inflammatory agents.

Consistence.—In all cases in which water has been extracted from the fæcal mass before evacuation, the consistence is hard, and the motion takes the form of pellet-like masses known as *scybala*. On the contrary, very fluid stools, loose and watery, and often most offensive, result from summer diarrhœa, colitis, dysentery, cholera, and typhoid fever, which has a characteristic

stool very like pea soup. Meat is apt to produce a dry, small motion, while vegetables, since they contain a great amount of residue containing cellulose, result in increased stool.

Other Unnatural Constituents of Stools.—All mental nurses should be on the look-out for the following abnormalities:

Undigested Food.—This should always be reported upon, although the presence of various seeds of fruits, pips, green vegetables, etc., need not be regarded with any alarm.

Mucus.—When there is much mucus, it appears as threads of slime, and may be the result of colitis; in dysentery, however, considerable masses of slightly blood-stained mucus may be passed at intervals.

Shreds of Membrane.—These indicate that there is ulceration of some part of the bowel. In cholera, the epithelium of the bowel comes off in flakes, which float among the watery motion and which give it the characteristic title of "rice-water" stool.

Fat.—If the stools are rather loose and frothy, with numerous small bubbles of fat, it is an indication that there is a deficiency of the bile or of the pancreatic juice.

Gall-stones.—Gall-stones and other foreign bodies may be found, and it is especially important to filter out the small faceted *calculi* after a previous attack of suspected gall-bladder colic, since their discovery proves the diagnosis.

Pus.—Various quantities of purulent matter may be passed when there is much inflammation, as in dysentery, or if there is any abscess or fistula in the neighbourhood of the rectum. Sometimes an abscess of the appendix discharges through the bowel.

Curdy Stools.—These are sometimes found in children in whom the digestion of the stomach is unsatisfactory.

Blood.—Blood is one of the commonest unnatural constituents, and it appears in various forms. It may be bright red, showing that it comes from the lower bowel; it may be black as a result of gastric or duodenal ulcer. If it is mixed with mucus, it may indicate obstruction of the bowel or dysentery; again, it may be associated with certain blood diseases such as purpura.

Parasites.—From the tiny thread-worm, frequently found in children, to the large round-worm, often the cause of trouble to adults, intestinal parasites are represented frequently in the stool. Round-worms are usually passed one at a time, but thread-worms are well known as occurring in crops, and they are a great source of annoyance to children. The tape-worm evacuates its flat *proglottides*, so many inches at a time. Often it is the nurse's duty to search for the head of the tape-worm after special treatment has been employed to evacuate it.

Foreign Bodies, etc.—Abnormalities of the fæces, as especially applicable to mental patients, are more extensively discussed in Section III.

Examination of Fæces.—The routine adopted in most hospitals is that the first motion passed by a patient, after his admission to a ward, is inspected by the sister, or at least by the senior nurse. If the doctor wishes any particular examination

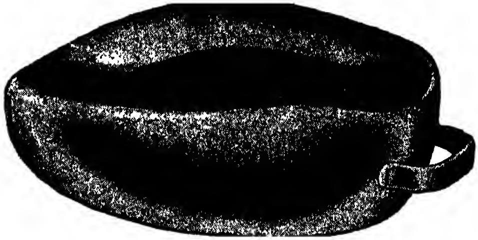


FIG. 84.—PERFECTION BED-PAN, ENAMELLED STEEL.
(By courtesy of Messrs. Willen Bros., London.)

to be carried out, there are special facilities for this. In such cases it is not advisable to retain the motion in the bed-pan, but it should be carefully transferred, freed from paper and cotton-wool, to a glass jar provided with a tightly fitted or overlapping lid; alternatively a square of lint soaked in strong carbolic acid may be tied over the top of the jar, which is left in a special place in the lavatory or in some cases put outside the window, until the examination has been made.

FIG. 85.—SPECIAL RUBBER BED-PAN MANUFACTURED ON THE PRINCIPLE OF THE AIR CUSHION.
(By courtesy of Messrs. Willen Bros., London.)

If there is any suspicion of dangerous microbes being active in the bowel, it is necessary to have the fæces examined bacteriologically. While a negative result of such examination, e.g. in dysentery or enteric fever, does not prove that these diseases do not exist, a positive result clinches the diagnosis. All bacteriological laboratories send out special glass tubes with corks to which are fitted small spoons, dipping into the tube. In selecting a specimen of fæces for examination the nurse should take a small spoonful of the last portion of the motion as soon as it is passed, then the cork should be tightly fitted into the tube and the whole should be sent, accompanied by full particulars, to the laboratory as soon as possible.

Bed-pans.—There are various types of bed-pan, some of which are illustrated. They may be made of enamel-ware, earthen-

ware, or stainless metal, which is more easily cleaned and much more hygienic. At any time a bed-pan is an unwelcome contraption, but its use is the only method of ensuring sanitary efficiency, and the nurse should make a point of helping the patient as much as possible to overcome his discomfort. The

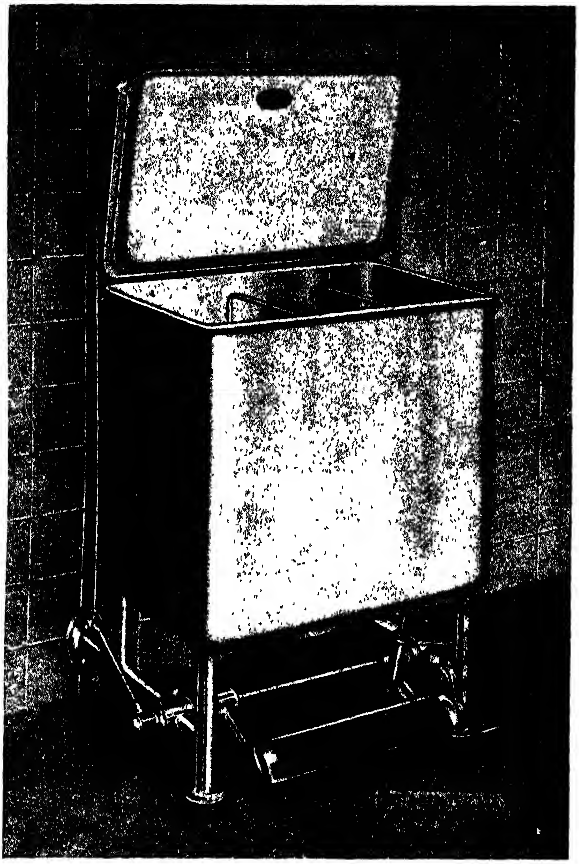


FIG. 86.—BED-PAN STERILIZER, COPPER AND NICKEL PLATE.
(By courtesy of Messrs. Dent & Hellyer, Ltd., London.)

selection of a suitable pattern depends upon the nurse and the patient. The slipper bed-pan is more easily applied but it is more uncomfortable than the circular bed-pan. In placing a patient on the bed-pan, the nurse should steady the body with her left hand at the base of the spine, and should gently raise the patient up, while he draws his heels up almost to his hips, thus

helping to make a modified form of the "human bridge." With her right hand, the nurse then places the bed-pan in position and carefully lowers the patient. When the time comes to remove it, there should be no attempt made to drag it away forcibly; even if it means getting extra assistance, the patient should be lifted clear. It should then be rapidly taken away, covered with a cloth, and carried to the sluice-room, where its contents should be immediately flushed out by the special apparatus installed, unless the specimen has to be retained for inspection. As a routine, it is generally necessary to rinse bed-pans out once a day with strong disinfectant, and then to wash carefully with soap and hot water. The illustrations show also an up-to-date form of bed-pan, made on the principle of the inflated cushion.

FIG. 87.—AN UP-TO-DATE BED-PAN WASHER (" PROTECTOR "), DEVISED TO CLEANSE THE UTENSIL BOTH OUTSIDE AND INSIDE WITH WATER AT ANY TEMPERATURE REQUIRED, AND IN A SEALED CHAMBER.

Urine bottles may be washed when the hinged door is open by placing them over the central nozzle.

(By courtesy of Messrs. Dent & Hellyer, Ltd., London.)

Urine

The liquid excretion which comes from the bladder is called urine and the passage of urine from the bladder is known as *micturition*. This function is one of the most important guides in the assessment of the patient's general condition, and nurses must at all times be able to discuss with the doctor the amount of urine passed, the characters, and anything unusual associated with micturition.

Abnormal Micturition.—*Frequency* is the term used to describe the passage of small quantities of urine at very short

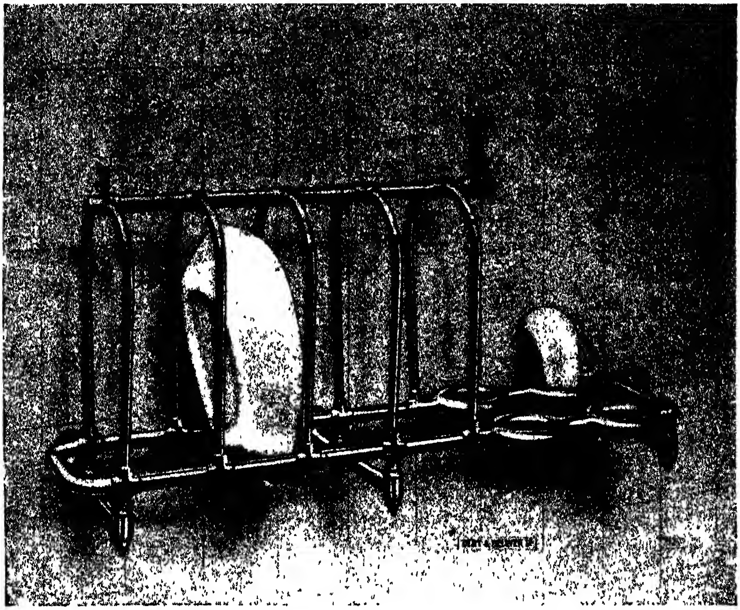


Fig. 88.—Bed-pan and Urine Bottle Rack, Consisting of Heated Tubes of Copper and Gun-metal.
(*By courtesy of Messrs. Dent & Hellyer, Ltd., London.*)

intervals. It occurs in any condition in which there is some irritation of the bladder, stone, inflammation, or ulceration of the bladder-wall, enlargement of the prostate gland, or the presence of " gravel," the popular name given to the fine crystals of oxalate of calcium insoluble in the urine. It may also be the result of pus in the kidney, tuberculous disease, and small or large stones. In a certain group of cases there is a reflex irritability due to prolapse of one or more of the pelvic organs; the pressure on the bladder carries considerable irritation. In this category are included prolapse of the rectum, displacement of the uterus, and the effects of certain tumours. In children, frequency may be associated with thread-worms, with irritation of the genital organs, especially phimosis, and sometimes merely with apprehension.

Polyuria.—It is possible generally to retain urine for about four hours without discomfort, but in many cases patients can tolerate collection of urine in the bladder only for half that time. It is a point of great importance that nurses should not object to the provision of urinals when they are demanded by patients, no matter how unreasonable the request may seem to the nurse,

or how busy she may be. In nervous, highly strung, and hysterical patients, the control of the bladder is one of the first powers to weaken. Apart from ordinary frequency, there may be increase in the actual amount of urine; this is called *polyuria*, and is found in diabetes, in many kidney diseases, in those suffering from the effects of alcohol, and occasionally when certain drugs have been given, which cause increased action of the kidney filters, and therefore of the bladder.

Incontinence.—Incontinence of urine may or may not be accompanied by incontinence of fæces. It is a sign of loss of bladder control, and it is a very trying condition, both for the patient and for the nurse, especially in cases where the urine constantly leaks, e.g. in senile people, and in those who have some spinal-cord affliction; it is almost impossible to maintain sanitary or hygienic conditions in such circumstances. There are various degrees of incontinence; the bladder may fill up and then suddenly expel its contents without the patient's knowledge; this is known as *reflex incontinence.* On the other hand, the bladder may become very much over-distended, so that only the surplus urine is passed. This is called *overflow incontinence.*

Enuresis, especially during the night, is one of the great problems of childhood. In this condition there may be slight inflammation of the bladder or some external irritative factor, or threadworms in the lower part of the intestine, which cause incontinence during sleep; in the majority of cases, it is due to some psychological defect, and it is often found that when a proper understanding of a child's mind is reached the enuresis quickly stops.

Suppression of Urine.—Suppression of urine is also known as *anuria.* If this is prolonged for any period, it usually ends fatally. It means that the mechanism of the kidneys has completely broken down and that the urine is being stored up in the blood, instead of being extracted by the kidneys and passed into the bladder. The name given to this disease is *uræmia*, and it frequently leads to convulsions, delirium, coma, and death. It must be carefully distinguished from the condition of partial suppression, which may be due to an acute but temporary breakdown of the kidneys.

Retention.—Retention of urine means that the kidneys are probably acting quite normally, but that there is some obstruction of the outlet from the bladder, which fills up as usual, and which may become very distended and painful. It is a common condition in certain types of paralysis, and often demands the use of a catheter, which has to be passed by the urethra every few hours. On the other hand, there may be narrowing of the urethra, owing to disease, causing a *stricture.* In some cases it is the result of nervousness, there being a sort of spasm which prevents the normal act of voiding the urine from being carried

out. This is especially noticeable after operations in the pelvis or lower parts of the abdomen, and retention of urine is one of the many important things to be wary of in cases of severe accident accompanied by shock.

Collection of Urine.—Numerous appliances have been devised for both sexes for the collection of urine from patients confined to bed. Some of these are illustrated.

For male patients a glass, earthenware, enamel, or bright metal urinal is most popular; it should be kept clean, and disinfected exactly in the same manner as the bed-pan, and on no account should a urinal be left at a patient's bed-side, underneath the bed, or in a cupboard, but immediately the patient

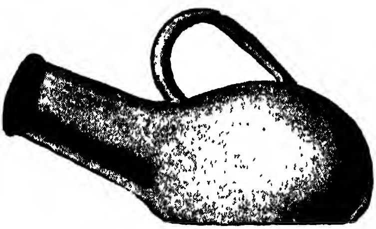


FIG. 89.—MALE URINAL, CONSTRUCTED OF SEAMLESS ENAMELLED STEEL.
(By courtesy of Messrs. Willen Bros., London.)

FIG. 90.—FEMALE URINAL, ENAMELLED STEEL.
(By courtesy of Messrs. Willen Bros., London.)

has passed urine, the nurse should cover the urinal with a cloth provided for the purpose, and should then dispose of the urine in the sluice-room.

For female patients, there is greater difficulty, as bed-pans are not entirely satisfactory. There are many patterns of specially devised earthenware urinals and bowls, which are illustrated, and which can be used if the bed-pan is not suitable, and also when a particular specimen is required.

In cases of nervousness and inability to pass urine, the application of hot cloths to the lower part of the abdomen or sponging the perineum with hot water should be tried. Usually it is found that if the patient is left to himself without fuss, and is not made nervous by people offering suggestions and gratuitously giving old wives' tips, everything passes off successfully.

Saving a Specimen of Urine.—No matter what the condition of the patient may be, all those newly admitted to hospital must have the urine examined within twenty-four hours. At first it is necessary to collect only the morning specimen, this being put in a special standard urine-glass, which should be covered with a plug of cotton-wool, and set on a shelf in the doctor's room, with the name of the patient affixed to the glass. The

nurse should therefore make sure that the specimen she saves is one which has not been contaminated in any way. Occasionally, the doctor wishes to know how much urine has been passed during twenty-four hours, and this is done by setting aside a glass jar with a tightly fitting cover in the sluice-room, and adding to it the various amounts passed during the twenty-four hours, care being taken that the bladder is empty at the beginning of the test and that micturition takes place at the end of the period. If the nurse is aware of any unavoidable loss of urine, she should report it. On a test day such as mentioned above, it must be ensured that none of the urine is passed into the bed-pan during defæcation. The normal amount passed during twenty-four hours is about 50 oz.

When there is a special type of microbe under suspicion, causing disease of the bladder or kidneys, the urine must be withdrawn, with all sterile precautions, from the bladder by a catheter, so that there is no question of the introduction of other microbes to the specimen from outside. The urine is carefully sealed up in a sterile tube and sent to the laboratory. Normal urine contains a certain number of bacteria, but urine which has been allowed to stand in the open air swarms with all types of microbe.

Testing of Urine

Assuming that the specimen of urine to be tested is in front of the nurse, and that it has been allowed to cool and settle for a few hours, a routine must be adopted in carrying out the tests.

The stand illustrated contains all the apparatus required. In the drawers are litmus and filter-papers, note-paper and pencil. The bottles contain various reagents in common use. A small spirit-lamp is also provided, a number of test-tubes, and a measuring glass. There is also a glass instrument known as a urinometer. This is weighted by a certain amount of mercury in a bulb, and when it is placed in a jar of water it registers 0, but in another fluid it does not sink so deeply, therefore it may float at a level indicated by one of the degrees marked on the stem, which is graduated from 0 to 60. The reading at the point of steady flotation added to 1,000 gives the specific gravity of the fluid; thus, if the stem remains fixed at a level of 28, the specific gravity is 1,028. The following are the essential tests approved by most authorities.

1. **Quantity.**—This does not come actually under the present system, as it depends upon observation of twenty-four hours. Nevertheless, when necessary, it should be included in the urine report.

Urine is *increased* in diabetes, chronic kidney disease, hysteria,

alcoholism, and after diuretic drugs. Urine is *diminished* in acute inflammation of the kidney, fevers, valvular heart disease, after severe diarrhœa, vomiting or sickness, by narcotic drugs, and in injury of the brain.

2. **Appearance.**—A small cloud of mucus at the bottom of the glass is of no significance.

Normal urine should be pale amber in colour, but where there is diminution in the amount, the colour may be much darker. If a great quantity of urine has been passed, the urine may look like water; this suggests *chronic kidney disease* or *diabetes*. On the

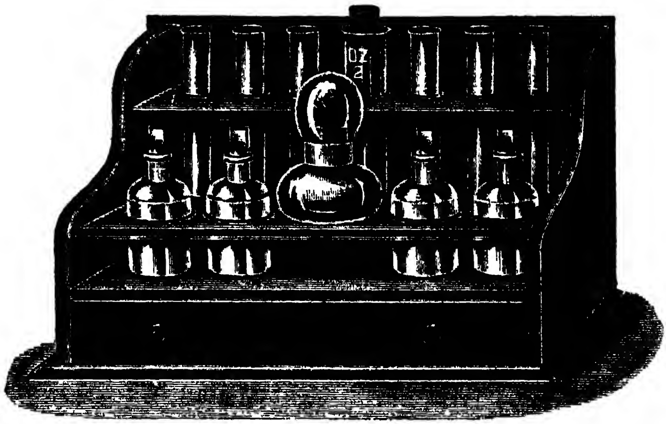


FIG. 91.—URINE TEST STAND.

Polished mahogany, complete with bottles, test-tubes, urinometer, trial jar, etc.

(*By courtesy of Messrs. Willen Bros, London.*)

other hand, after certain drugs, and in certain forms of *poisoning*, e.g. phenol, the colour may be almost black. A smoky urine indicates the presence of *blood*, while dark-green colour indicates *bile*. Acute kidney disease or any of the fevers causes very highly coloured urine.

In addition to, or replacing, the deposit described above, urine may contain considerable quantities of pink urates or white phosphates. Pus may also settle down as a yellowish deposit at the bottom of the glass. To distinguish between pink urates and white phosphates, heat a little urine in a test-tube; if urates are present they will disappear; phosphates can be dissolved by adding a small quantity of weak acetic acid. Pus can be tested for by the method described below.

3. **Odour.**—It is always advisable to smell the urine, and the odour may be best appreciated immediately after the plug of cotton-wool has been removed. Urine which contains acetone

is supposed to resemble the scent of new-mown hay or of very ripe fruit, and may indicate *diabetes*. When there is much pus present in urine, there is the characteristic smell of decomposition.

4. **Reaction.**—Urine is either acid or alkaline. Normally it is acid except immediately after meals, but as the specimen is usually collected first thing in the morning before any food has been taken, the normal specimen should therefore be acid. The blue litmus test paper is turned red, while the red paper remains red. An alkaline urine behaves in exactly the opposite way. When the urine stands for any time it decomposes, turns alkaline, and develops a strong odour of ammonia. For this reason, specimens of urine should always be examined in the fresh state. If urine is found to be alkaline, it must be made acid by adding a small quantity of acetic acid, which does not affect other tests. Occasionally urine is said to be *amphoteric*, i.e. it has a positive reaction to litmus paper of both colours.

5. **Specific Gravity.**—This test is carried out by using the *urinometer* described above. Care should be taken that when this instrument is placed in the specimen glass it does not touch the sides of the glass or rest on the bottom. The eye should be brought down to the level of the surface of the urine in order to get a correct reading. Usually the reading is about 1,020; if it is as low as 1,008 it may be due to increase of fluid intake, *diabetes insipidis*, or chronic nephritis. When the urine is very pale and registers anything above 1,035, sugar is probably present and *diabetes mellitus* may be indicated.

6. **Tests.**—The following tests should then be carried out in order to prove the presence or absence of abnormal constituents which are important in certain diseases.

Albumin.—The first test is the *heat* test. Put about 4 inches of urine in a test-tube, hold it at an angle over the flame, so that the upper portion only is boiled. If a cloudiness is produced, the indication is *albumin* or *phosphates*. One drop of nitric acid or a few drops of acetic acid will clear up the phosphates but will not affect the albumin.

As a confirmatory test for albumin, about 1 inch of nitric acid should be put into a clean test-tube. A small quantity of urine should then be very carefully run down the side of the test-tube, which is held at an angle of 45°. At the point of junction of the two fluids a definite white ring indicates that albumin is present. This is known as the *cold* test.

The presence of albumin generally indicates inflammation of the kidneys, but it may also be found in anæmia, heart disease, etc. The white cloud formed by heating is exactly the same as the white substance which appears when an egg is poached; naturally in urine-testing the amount of albumin is minute.

Albumin can also be tested quantitively by using picric acid in a special test-tube called Esbach's *albuminometer*, but nurses are very rarely expected to do this test, which ought to be carried out by a doctor.

Blood.—About ½ inch of urine is placed in a test-tube and a few drops of tincture of guaiacum are added, then the thumb is placed over the end of the tube, and the contents are vigorously shaken. In another test-tube should be placed about 1 inch of ozonic ether; then a little of the first mixture is carefully added. If blood is present, a distinct blue ring will develop at the meeting-place of the two fluids.

Bile.—Bile in urine indicates jaundice or liver affections. The test for this is as follows: A white glazed tile is obtained and a few drops of urine are put on one part, while a few drops of strong nitric acid are put about 1 inch from it. When the two run together, there is usually produced a rainbow effect which quickly passes off, but if green is found to predominate it is a proof of bile. Another test for bile is the addition of a few drops of *liquor iodi mitis* (B.P. 1932); a green reaction indicates the presence of bile.

Sugar.—Two test-tubes are taken, one containing 1 inch of urine and the other 1 inch of Fehling's solution; each should be boiled. Then the urine is poured carefully into the blue solution. A *yellow* reaction indicates a moderate amount of sugar, but if it becomes *orange* or *brown* it means that there is a large quantity of sugar, and quantitive tests may be required. Sometimes a faint green reaction is obtained which is quite compatible with good health. As in the case of albumin, nurses are not expected to be able to estimate the quantity of sugar present.

Acetone and Diacetic Acid (the Ketones).—The *ketones* are found in people who are starving, especially in those who have not been taking enough starchy food. It is also an evidence of dangerous diabetes, and it may also prove chloroform poisoning of a delayed type.

The test for acetone consists of adding about a teaspoonful of ammonium sulphate to a small amount of urine in a test-tube, and after this has been shaken vigorously, 2-5 drops of freshly prepared solution of sodium nitro-prusside (2 per cent.) is added, and following this about ½ inch of concentrated ammonia. The mixture is agitated slightly, and left to stand for half an hour, when a *deep violet-red* colour develops.

For *diacetic acid*, the test is the addition of a little ferric chloride (10 per cent.) to about 1 inch of urine in a test-tube. There may be a slight precipitation of phosphates, in which case the ferric chloride should be added drop by drop. A *port-wine* colour indicates diacetic acid.

Before operations involving the giving of chloroform, the patient's urine should be tested for *ketones*.

Pus.—The real test for pus consists in taking a small portion of the deposit and examining it by the microscope. Other well-known tests are the addition of a little *liquor potassæ* to the deposit. A ropy precipitate is obtained. Another method is the addition of a few drops of hydrogen peroxide; if much frothing takes place, pus is present.

CHAPTER 10

IRRIGATION OF BODILY CAVITIES

VAGINAL DOUCHE. IRRIGATION OF THE BLADDER. RECTAL LAVAGE. GASTRIC LAVAGE. IRRIGATION OF THE THROAT. NASAL IRRIGATION. IRRIGATION OF THE EAR. BATHING OF THE EYES. THE ENEMA. ROUTINE OF ENEMA ADMINISTRATION. APPARATUS REQUIRED. HOW TO GIVE AN ENEMA. CLEANSING, EVACUATING, OR SAPONACEOUS ENEMA. PURGATIVE ENEMA. ANTI-SPASMODIC OR CARMINATIVE ENEMA. ANTHELMINTIC ENEMA. EMOLLIENT OR SEDATIVE ENEMA. MEDICINAL ENEMA. STIMULATING ENEMA. CARE OF ENEMA APPARATUS. ENEMA RASHES. SALINE TREATMENT. NORMAL SALINE. INTRAVENOUS INFUSION. SUBCUTANEOUS INFUSION. RECTAL INFUSION. CATHETERIZATION. PASSAGE OF THE FEMALE CATHETER. PASSAGE OF THE MALE CATHETER.

THE word *douche*, formerly considered as applying to the lavage of the vagina, is now regarded as comprising the washing out, or irrigation, of any cavity—nose, ear, eye, throat, stomach, rectum, bladder, vagina. The average doctor likes his patient to have every opportunity of getting rid of harmful germs in the various cavities of the body. The nurse, therefore, is frequently charged with the duty of carrying out the various irrigation procedures mentioned below.

Vaginal Douche

Apart from the routine vaginal douching with warm water which is carried out by the majority of women as a hygienic measure, there are various specified types of *vaginal douche*, such being used in disease or abnormal functional conditions. Many women cause uterine and vaginal troubles by improper use of douches, and the nurse must understand clearly how the operation should be carried out. Higginson's syringe or the whirling spray may be all very well in the home, but in the sick-room or hospital the nurse must use a douche-can. In time, the patient may be taught how to carry out the treatment, and in many cases does so quite well.

The douche-can is set above the bed, usually about the level of the top upper rail, or higher if necessary. It is provided with several feet of rubber tubing, a glass vaginal tube, and a clip placed at the end of the rubber tube to regulate the flow of lotion. If the patient is in bed, Kelly's flushing douche cushion

FIG. 92.—KELLY'S FLUSHING CUSHION.

(By courtesy of Messrs Willen Bros., London.)

and pad may be used, or a large-size bed-pan on a mackintosh, but, where they are provided, *bidets* are ideal for persons who can get up. Various lotions may be used—phenol, lysol, dettol, amphyl, alum, potassium permanganate, or mixtures, and these are made up in a large enamel jug from which the can is refilled, the temperature being anything from 105° to 120° F., according to the nature of the complaint; as a rule, the hotter the better.

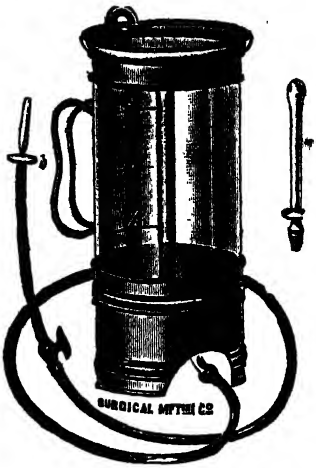


FIG. 93.—METAL AND GLASS DOUCHE-CAN WITH RECTAL AND VAGINAL FITTINGS.

(By courtesy of the Surgical Manufacturing Co., Ltd., London.)

The patient should have the hips raised if possible, and sometimes the Sim's or the lithotomy position is used; during the operation, care should be taken that the patient is well covered by a blanket. After a preliminary toilet of the vagina (see following chapter), the nurse passes the glass tube as close to the posterior vaginal wall as possible, and should aim at putting the end of the glass nozzle in the posterior fornix. It is well to smear a little thin oil on the glass before passing it in. The tap is opened, the steady flow is kept up, and the returning fluid is collected in the appropriate receptacle—bed-pan, bucket, or other suitable container. The tube is carefully withdrawn after the douche is over, and the perineum is well dried with a soft towel. A Turkish towel or napkin should be placed below the buttocks to catch any remaining fluid, which slowly collects and trickles out.

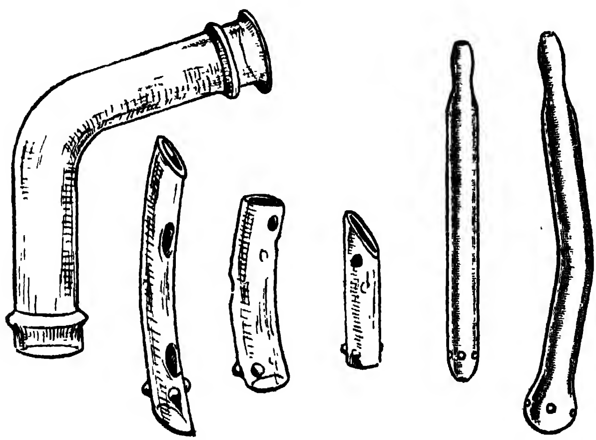


FIG. 94.—TYPES OF GLASS TUBE USED FOR BOWEL AND VAGINAL IRRIGATION.

Irrigation of the Bladder

Bladder lavage is used when there is chronic inflammation requiring constant irrigation, or when the bladder has to be prepared for operation or for examination by the cystoscope. The same appliances and precautions are necessary as for catheterization (see paragraph at end of this chapter), but in addition there should be provided a long piece of rubber tubing, glass connection and funnel, supply of the lotion (boracic acid or weak silver nitrate), and bucket to take the returned fluid.

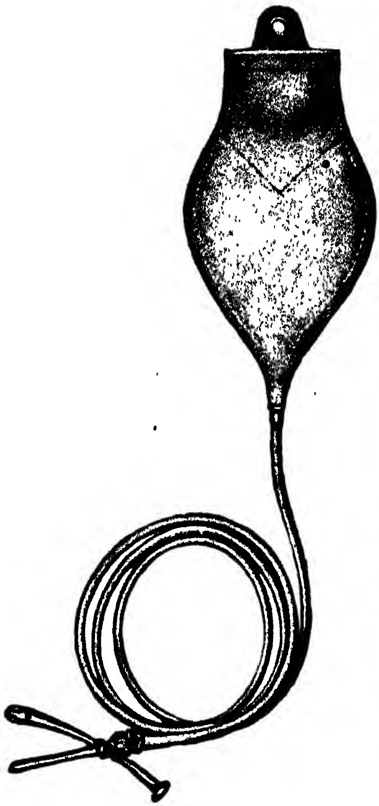


FIG. 95.—RUBBER DOUCHE-BAG WITH TUBING AND RECTAL OR VAGINAL END-PIECES.

(*By courtesy of Messrs. Willen Bros., London.*)

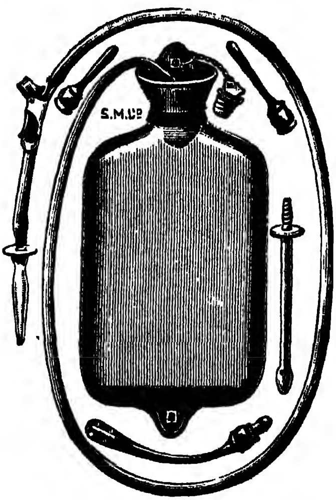


FIG. 96.—FOUNTAIN DOUCHE AND HOT-WATER BOTTLE COMBINED.

Note the various rectal and vaginal end-pieces.

(*By courtesy of the Surgical Manufacturing Co., Ltd., London.*)

After the bladder has been emptied by the ordinary catheter, a fresh sterile one is passed, and attached to the tube and funnel by the glass connection. By pinching the rubber tube, the fluid can be held up until ready for liberation. The irrigating fluid is then run in until the patient complains of a tense feeling almost

amounting to a pain; at the same time it will be noted that the fluid, which should be at a temperature of about 105° F., flows back to the funnel. Any excess of lotion is dangerous to the bladder, as it may travel up the ureters, and therefore irrigation should never be pushed beyond the early limit. The first "wash" is an indication of the capacity of the bladder, and when the next one is given, it is a good thing to give about an ounce less, as there will be ample to make a complete lavage of the bladder wall. To remove the liquid, it is necessary simply to lower the funnel and allow it to run into a bucket, then to fill up again, until in all about a quart of the irrigating fluid has been given. The time spent on this procedure varies according to the type of the trouble and the type of patient. The last "return fluid" should be clear and free from debris.

Rectal Lavage

There are different ways of giving this treatment, which is useful in all cases of chronic diarrhœa or in any condition of the bowel in which the effect of an antiseptic, astringent, or soothing lotion may be required. A long rectal catheter may be used, and it is advanced slowly as the bowel fills with the fluid, which should flush out the lower part of the descending colon. For an adult, it is customary to give normal saline, or a solution of sodium bicarbonate (one teaspoonful to the pint), up to 6 pints. The temperature should be about 105° F., so that the lotion will be roughly 100° F. when it reaches the colon. Massage may be done to assist the passage of the fluid upwards. By using the slow enema method, a thorough cleansing may be effected, the patient returning the fluid after it has been in the bowel for as long as he can keep it, usually a few minutes. If the siphon method is used, only 2 pints can be given, and the contents are returned as soon as the funnel is lowered.

Gastric Lavage

When vomiting becomes intractable, or in cases in which there is narcotic poisoning, the stomach may be washed out. It is the best treatment for an overdose of alcohol, with coma. The stomach also becomes dilated in cases of pyloric and of intestinal obstruction, and it should be washed out before operation.

The ordinary stomach tube is the best. In comatose persons, it may be necessary to pass the tube with the patient in the recumbent position, but if possible it is better if he can sit up. Weak mustard and water may be used for alcoholics; it is poured from a height and 1–2 pints are put in. The result is usually complete evacuation of the poisonous stomach contents. In the conscious

cases, the washing may have to be done until the returned fluid is quite clear; weak Condy's Fluid, saline solution, boracic acid, or sodium bicarbonate are all useful. About a pint is given at a time from a large enamel jug, the contents of which are about 100° F. The tube is clamped, the stomach wash is poured into the funnel, which is held well above the patient's head, and when the clamp is released the fluid goes into the stomach with a certain amount of force. To begin with, the patient usually vomits, so that a large enamel basin should be set in front of him. Patients can become quite expert at passing the tube themselves, and all they require after a time is assistance with the lotion. In order to empty the stomach properly each time, the funnel must be brought as low as possible, and the tube must contain a column of fluid, so as not to break the siphonage. The returned fluid should be received into an enamel bucket placed on the floor or on a low table.

Irrigation of the Throat

The throat may be dealt with in several ways. The simplest is the *gargle*, which is a method of washing out the pharynx, tonsils, posterior nares, and mouth by taking a full mouthful of an antiseptic solution, tilting the head backwards, and keeping the fluid bubbling at the back of the mouth by making vigorous exhalations. Common remedies in use are glycerine and borax, phenol-glycerine (3 fluid drachms in 8 oz. of water), glycothymoline, dettolin, and sotol. The mouthful is expectorated and the process begun again. Sometimes it is necessary to *paint* the throat with glycerine, 5 parts, and tannin, 1 part, or with iodine; care should be taken not to prod the tonsils and not to cause reflex vomiting due to tickling of the nerve endings. The patient should be told to sit up, to hold his mouth wide open, and to keep on saying the word "Ah." A tongue depressor may be required. *Sprays* of various kinds may also be used to spread drugs over the throat. For the teeth and gums especially, carbonic acid gas has recently been shown to be of great benefit. The apparatus and method of use are illustrated on p. 44.

Nasal Irrigation

This can be done in several ways. First there is the method of *syringing*, which is done with a glass syringe or a rubber ball syringe. Great care must be taken not to damage the mucous membranes or to drive septic matter into the pharyngo-tympanic tube. The aim of the nurse should be to wash away any discharge by gently softening the mass lowest down, and thus progressing slowly upwards until all the plug is removed. For adults

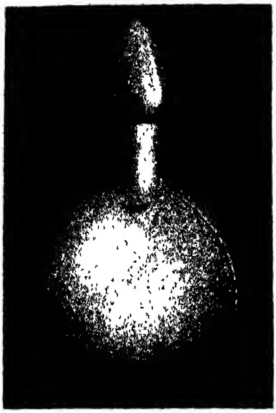


FIG. 97.—NASAL SYRINGE.
(*By courtesy of Messrs. Willen Bros., London*)

a much better system is that of *douching*, in which a glass funnel, or douche-can, preferably the latter, is fixed 9–12 inches above the patient's head. It is connected by rubber tubing to a glass nozzle. The clamp should be close to the douche-can, which contains normal saline, sodium chloride solution, or sodium bicarbonate solution at a temperature of about 105° F. The chest and shoulders are protected by a mackintosh and towel, while a bucket is put at the patient's feet; he may sit or stand. He also holds an enamel kidney basin in his hands to catch any mucus, etc. When all is ready, the clamp is loosened. The patient should be told to take short breaths during the operation. The end of the nozzle need not be inserted more than ½ inch up the nostril.

In some cases, a lotion can be " drunk " through the nostrils from an enamel mug. The patient bends slightly forward over the bucket, takes the mug in his right hand, tilts the mug under his nose, and sniffs up the fluid through his nostrils by taking an exceptionally deep breath. This fills both nostrils. At this stage, the mug is removed for a moment from the nose, while the patient snorts down vigorously. The procedure is repeated until the lotion is used up. There are also numerous sprays for the nose, these acting by spreading a fine vapour of pine oil or other nasal antiseptic over the lining of the nose. In some cases, special glass containers with nozzles are pro-

FIG. 98.—NASAL DOUCHING BY THE ENAMEL-MUG METHOD.

vided for lotions, but, as a rule, they are not so successful as the enamel-mug method.

Irrigation of the Ear

Of all operations, the syringing of the ears is one of the most delicate and most important, yet it is surprising to see how many people undertake to syringe out the ears without really knowing how to do it. The syringing of the ears should never be done without a doctor's permission, and in many cases the doctor prefers to carry out the treatment himself. It is quite safe to put in *medicated drops*, or to swab out the canal with hydrogen peroxide, but when *syringing* is necessary it is imperative that the utmost conformity to the following method should be made.

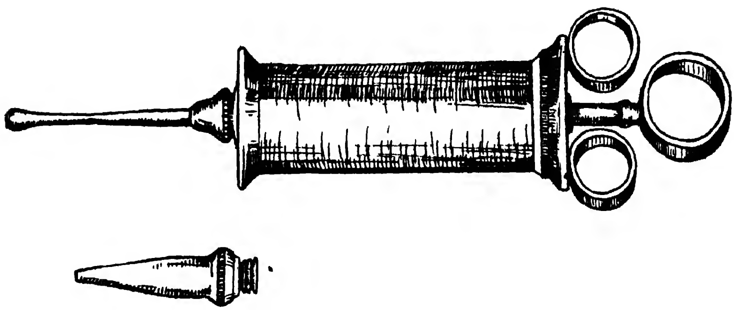


FIG. 99.—EAR SYRINGE.

The patient sits on a chair, a mackintosh round his neck and covering the rest of his body. He holds a kidney basin with the concave border pressed to his cheek immediately below the ear. The nurse has the lotion, at a temperature of 105° F., all ready in a sterile basin or glass jar. The syringe should be all brass or other stout metal, and the piston should be tight but not too stiff. It is essential that a considerable force should be present in the jet of lotion. The barrel of the syringe is filled slowly, care being taken that all air is excluded by pushing up the piston until the liquid spurts out. The nurse gently pulls up the pinna with her left hand, and passes the point of the nozzle along the upper part of the canal following the direction of the passage, and making sure by depression of the handle of the syringe that the point is on the roof. This is important, as it not only prevents the stream being directed straight on to the drum; it ensures that, in the event of a wax plug being present, the wax is not driven hard against the drum, but is loosened above and propelled out of the canal by the fluid behind. This simple

operation is one that can only be done after some experience, yet it is one of the most commonly required treatments in general practice. In order to clear the ear of water or lotion, the patient should incline the head towards the kidney basin. The nurse should complete the operation by swabbing the canal with a blunt probe to which a small pledget is fixed.

Bathing of the Eyes

For this a special apparatus, called the undine irrigator, is used; it is very like a miniature retort as found in chemical laboratories. Many people prefer to drop lotions into the eyes with a small glass tube drawn to a fine point and emptied by a rubber teat. At all times the operation must be regarded as a strictly aseptic one, since many eye inflammations are very infectious. The best way to carry out the treatment is to surround the patient with a mackintosh as before, and standing behind him, place a towel round his head as close to the eyebrows as possible. The head can then be bent back as far as possible, so that the eye-sockets form cups for the lotion. The patient may hold a kidney basin close to his cheek. If the undine is used, the two eyelids are widely opened by the left forefinger and middle finger of the nurse, while she lets the lotion flow from the nasal side. During the process, the patient is told to move his eyeballs about in all directions. A saturated solution of warm boracic acid is generally used.

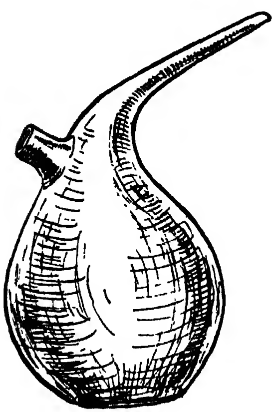


Fig. 100.—Undine used for Irrigation of the Eye.

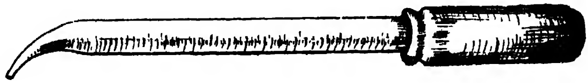


Fig. 101.—Eye Dropper.

In the eye-dropper method, frequently employed for stronger lotions, the lotion is introduced by steady drops, while the patient is put through a form of eye drill, looking in various directions as ordered. This allows the eye to be slowly washed in an antiseptic for a much longer period than with the undine. The various eye-glasses which are sold as douche glasses are not of

much use unless the eyelids are opened wide while the glass is held close to the surrounding skin. As a matter of fact, this is the very thing that is almost always difficult to do, and the operation is unsuccessful because the lotion often trickles down the cheek without touching the eyeball.

The Enema

The natural outlets for the waste products of the body must be kept open, otherwise a certain degree of poisoning results. It is therefore of the greatest importance that the bladder and rectum should be emptied at regular intervals. When there is a need for artificial emptying of the lower bowel, the introduction of a fluid, sometimes consisting of a solution of a drug, is carried out. To this injection we give the name *enema.*

An enema can be used in several ways. It can be employed simply as a flushing agent for the lower bowel, and is then known as a *cleansing* enema. When certain purgative drugs are added to the enema it is known as a *purgative* enema. A third variety is the enema which has a carminative or soothing effect; this is known as the *anti-spasmodic* enema. Again, the enema may be used for removing worms or other parasites from the colon, in which case it is known as the *anthelmintic* enema. A fifth variety is one which is stronger than the carminative enema, and which is used as a sedative in irritative conditions of the bowel with diarrhœa. This is called the *emollient* enema. The sixth type is the *medicinal* enema, to which certain drugs are introduced in order to create a local effect, or because they act more quickly than when given by the mouth. The *stimulating* enema is one which contains certain drugs having an effect on the nervous system; it is used after severe cases of shock or collapse. Lastly, the *nutrient* enema is used to introduce nourishing matter into the lower bowel when the stomach cannot tolerate any food. Opinions on the advantages of this vary very much.

Routine of Enema Administration

With exception in the case of the sedative enema, which is given cold, the temperature of the solutions used must always be round about 100° F. The amount to be injected depends upon the conditions for which the enema is given. Thus when a cleansing effect is required, and therefore the solution is to be returned in five to ten minutes, there must be a quantity of the fluid sufficient to distend the bowel and to irritate it enough to cause a reaction on the part of the colon with increased peristalsis and consequent copious evacuation. It is not a question of turning on a hose or of swamping the lower few feet of the bowel, but

rather a matter of carefully and slowly adding as much bulk of fluid as may be comfortably retained in the bowel for the necessary period, during which time the fæces are softened, broken up, or even liquefied, the result of which is a complete clearance of the mass which it is desired to remove. It has been found that fluid introduced at the anus will travel back to the cæcum in ten minutes, showing that the whole of the large intestine can become flooded in that time.

Sometimes it is desired to inject fluid and let it stay for half an hour or longer; especially is this so when absorption is necessary. In such cases the enema is very small in quantity, varying from ½ oz. to 10 oz., and it must be slowly and carefully introduced.

Apparatus Required.—Usually a Higginson's syringe is employed; every nurse learns the use of this early in her training. Another method is that of the douche-can, with rubber tubing; this allows a very easy injection to be made. The higher up the douche-can is placed the greater is the flushing effect. The third method in use is probably the most satisfactory. It consists of a small funnel or glass syringe-barrel with rubber tubing, to the end of which is attached a catheter (Jaques', Nos. 8 to 12) or rectal tube, which passes into the bowel for from 6 to 21 inches. When a very small quantity is prescribed, it may be necessary to use a small glass and vulcanite syringe, holding anything from ½ oz. to 2 oz. Catheters in use vary in size according to the amount to be injected. For the small quantities, Nos. 6 to 10 are efficient, but usually a No. 12 rubber catheter is used. Generally the catheters are connected to the rubber tubing by small glass connections; in this way the inflow can be observed.

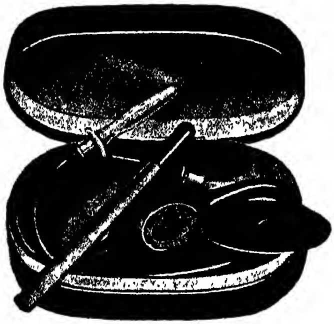


FIG. 102.—ENEMA SYRINGE WITH FITTINGS.
(By courtesy of Messrs. Willen Bros. London.)

How to Give an Enema.—Before injecting the fluid, the nurse should collect all the material she requires. First of all, she will have ready a carefully measured quantity of the solution, whatever it may be, and she should also have a small mackintosh sheet, a towel or old draw-sheet, a quantity of vaseline, and a bed-pan. If the enema is to be administered by douche-can, the whole apparatus must be carefully inspected to see that the can is firmly fixed to the wall, and that there is no defect in the tubing, glass connection, or catheter.

Everything being ready, the nurse places the patient on his

left side, and puts the mackintosh, covered with the draw-sheet or towel, both of which have been warmed, under the patient's hips. She then rolls down the bed-clothes to the bottom of the bed, leaving the patient covered only by a blanket. The position of the patient is very important. In certain cases, e.g. after abdominal operations or in fractures of the vertebral column or pelvic bones, or when splints make it difficult for him to be moved, he may be allowed to lie on his back. As a general rule, however, he should be on his left side with the buttocks as near to the edge of the bed as possible, and the knees drawn well up to the abdomen. The nozzle of the apparatus should be well lubricated with vaseline, and the nurse should ensure that all air is driven out of the tube by letting a little of the fluid escape from the can. The catheter is held in the right hand, while the index finger of the left hand is used to assist the entrance of the tube at the anus. The introduction of the tube should be done with the utmost care, and on no account should there be any hurrying of the process. After 2 inches of the tube have been inserted, a little fluid should be allowed to run in, then the tube should be passed a little farther up and more fluid introduced. Finally, when there are 8 to 10 inches of catheter in the rectum the rest of the enema can be given, but success depends entirely upon the patience and the skill of the nurse in making sure that the fluid is not sent into the lower bowel with a rush, which causes pain and discomfort and inability to retain the fluid for the prescribed time. The withdrawal of the tube must be done as carefully as the insertion, and the patient should be reassured that there is nothing to be afraid of; he should also be instructed to lie perfectly still. To make sure that the enema is not immediately returned, the nurse should press a folded towel closely to the anus and perineum for a few minutes. When the enema has been left for a sufficient time and the patient is able to retain it no longer, the bed-pan should be provided and evacuation allowed. Unless the nurse has mastered the art of giving a successful enema, she cannot count herself as skilled in the elementary principles of nursing.

Types of Enema

Cleansing, Evacuating, or Saponaceous Enema.—This enema is employed for the mechanical emptying and washing out of the lower part of the bowel. It may consist of warm water (*enema simplex*), but generally it is made of soap solution (*enema saponis*). The latter is used to clear out the bowel before operations, or before rectal feeding is given, or prior to a confinement; it may also be used in cases of chronic constipation.

In making the enema saponis, about 1 to 1½ oz. of soft soap,

or ordinary yellow soap (shaved down and boiled until it is of jelly-like consistence, and then strained), is added to 1 pint of boiling water. It is usual to add to this about 3 oz. of olive oil, and after thoroughly mixing, the whole is diluted up to 2 or 3 pints, and allowed to cool to 100° F. Generally 2 pints should be given to an adult.

Purgative Enema.—This may take several forms. The first may consist of *olive oil*, and is frequently used in very severe cases of constipation with hardened fæces, or in any condition, such as piles or cancer of the rectum, in which there is pain in the movement of the bowel. It is very satisfactory in conditions of severe exhaustion, such as are found in prolonged pneumonia, in the latter stage of enteric fever, and when surgical conditions of the abdomen necessitate the avoidance of all strain in defæcation. To make up the olive-oil enema, from 2 to 10 oz. of oil should be carefully heated until it is at a temperature of 105° F.; this can be done by placing the olive-oil bottle in hot water for a certain time. In many cases it is necessary to elevate the end of the bed on blocks, in order to ensure complete retention of the enema, which should be run in very slowly, and should be introduced by the funnel and rubber-tube method, allowing about half a pint to flow in during half an hour. If smaller quantities are used, the time is naturally shorter. Sometimes the oil is left in for a whole night, but usually after about four hours a generous soap-and-water enema is given to clear out the solution; this relieves the whole of the lower bowel.

Another purgative enema is the *glycerine* enema, which has a certain irritating effect on the bowel wall, and therefore has stimulant qualities. The glycerine extracts liquid from the mucous membrane and thus makes the fæces soft or fluid so that within about half an hour of giving an enema of 4 drachms to an adult or ½ drachm to a child, there is a copious evacuation. In giving this type of enema the vulcanite-nozzle syringe is the best apparatus to use. The solution should be injected low down in the rectum—just above the internal sphincter muscle of the anus.

Several other purgatives can be used to empty the lower bowel, of which the commonest are castor oil, magnesium sulphate, and ox-bile. The castor-oil enema is made by adding 1 oz. of castor oil or more to three times the quantity of olive oil. This is given in the usual way, and about half an hour later an ordinary soap-and-water enema is introduced. In the magnesium-sulphate enema, 6 oz. of warm solution of magnesium sulphate are introduced. The ox-bile enema is made by adding 20 grains of purified ox-bile to 2 fl. oz. of warm water. This may be injected as it is, or added to about half a pint of soap solution or olive oil.

In the above methods, the tube-and-funnel apparatus is most

satisfactory. The patient should be urged to retain the solutions for at least half an hour.

Anti-spasmodic or Carminative Enema.—In some cases of abdominal disease, but particularly after abdominal operations, there is painful retention of fluids which cannot be expelled owing to temporary inactivity of the bowel muscle. The bowel distension can be relieved by giving a *flatus enema*, which usually consists of turpentine mixed with olive oil or soap solution. Normally, 1 oz. of turpentine in 2 pints of soap solution is quite satisfactory; in some cases, however, 12 oz. of mucilaginous starch is used instead in order to act as a soothing element for a raw portion of the bowel. Other substances employed in carminative enemas are oil of rue and asafœtida.

Anthelmintic Enema.—The aim in giving an anthelmintic enema is to destroy thread-worms and other parasites. The simplest anthelmintic enema is salt and water, given cold, in a strength of 1 oz. of salt to 2 pints of water. A more popular remedy is 10 oz. of infusion of quassia, also given cold, and made up by adding 1 oz. of quassia chips to 1 pint of water. Generally 6 to 8 oz. of fluid are quite sufficient to do the work required. As a preliminary, the bowel should be cleared by giving a simple enema. The longer an anthelmintic enema is retained the better. Turpentine is sometimes also used for this purpose.

Emollient or Sedative Enema.—In cases of very mild diarrhœa with pain, often associated with an ulcerated or raw condition of the mucous membrane of the colon, some smooth lubricating substance is required, and this can be provided by making up thick solutions of starch, gum, linseed, etc., often mixed with opium. The starch-and-opium enema is made by adding a certain amount of laudanum, generally 20 to 30 minims of tincture of opium to 4 oz. of starch mucilage at a temperature of 100° F. In some cases the starch is slowly introduced first, then the opium, and then further starch, a No. 8 catheter being used, or, if pressure is necessary, a glass syringe.

Medicinal Enema.—Certain drugs cannot be tolerated by patients, either because they have a dislike to them or because they result in vomiting. The well-known sedative and sleeping-draught, paraldehyde, can be given either in olive oil or in water, but a good method is to give first ½ oz. of warm water, then the prescribed amount of the drug, then another ½ oz. of warm water.

Astringents may also be introduced by enema to the rectum in cases of hæmorrhage, colitis, and dysentery. The common agents used are: 2 per cent. tannic acid, quinine 1 in 2,000, and silver nitrate 1 in 1,000. These solutions are always specially

prescribed and dispensed, and the nurse usually has particular instructions about them, since 5 pints may be necessary at a time.

Stimulating Enema.—If there has been severe hæmorrhage, or great shock, or general collapse, or if a depressed condition due to drugs is being treated, a stimulating enema may improve the patient very quickly. In most cases, 1 pint of normal saline solution, to which there has been added 1 oz. of brandy and 1 oz. of glucose, is prescribed. It is best to have the temperature of the solution at least 110° F. Another remedy used in this way is black coffee, containing brandy, 4 oz. of the former to ½ oz. of the latter.

A popular method of giving saline injection for cases of great collapse is as follows: Since for all practical purposes the salt solution should drip into the bowel, one of the smallest-sized catheters is introduced well up into the colon, and about 1 oz. every five minutes is allowed to pass in, the temperature being 100° F. Various forms of apparatus have been devised to maintain the heat of the saline fluid.

Care of Enema Apparatus

The chief things to remember about the care of enema apparatus, syringes, etc., is that olive oil has a deleterious effect on rubber, and that it should never be allowed to remain a minute longer than necessary in contact with tubing, mackintosh sheets, etc.

Catheters should be rinsed out very carefully, especially the eye portions. All rubber should be boiled for about five minutes in salt and water. Glass should also be washed in soap and water, and then placed in warm water, which is slowly brought to the boil. All oils should be carefully removed from every part of the apparatus by boiling in soap and water and then thoroughly rinsing in warm water. The Higginson syringe should have the nurse's special attention. She should make sure that it is carefully cleaned and dried, especially the nozzle, and it should be hung with the nozzle pointing downwards. Rubber perishes very easily if it is folded in any way.

It is advisable before giving an olive-oil enema to place the funnel and tubing in a hot solution of soap, contained in an enamelled basin set at the side of the bed. This solution prevents the rubber being affected by the oil and also assists in the lubrication. Drops of oil on mackintosh sheets should at once be mopped up, otherwise they will cause rotting of the rubber.

Enema Rashes

An alarming-looking eruption may be found sometimes at any period between twelve and twenty-four hours after an enema has been given. The distribution varies; sometimes there is

a general rash like scarlet fever, but more usually very small patches of red rash arise prominently over the knee-caps and elbows, on the hips and on the cheeks. There is no discomfort, nor is the temperature raised, but the appearance is alarming to the patient, and sometimes infectious disease is suspected. It usually passes off on the second day.

Saline Treatment

In severe cases of hæmorrhage and shock, it is often necessary to replace the lost fluid and to raise the blood-pressure by adding a large amount of saline liquid to the body. It is impossible to give this by the mouth, the rectal method is too slow, and therefore the speediest way to introduce the saline is by putting it directly into a vein or into the subcutaneous spaces.

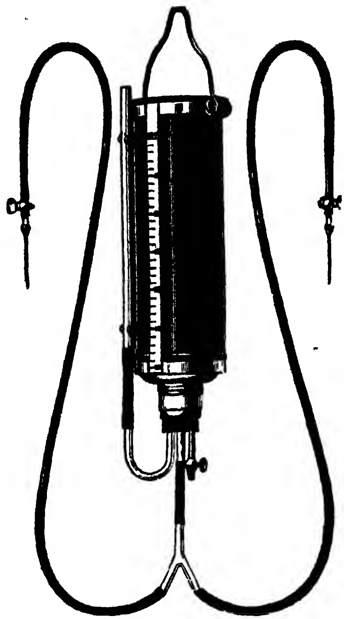


FIG. 103.—CARRUTHERS' SALINE APPARATUS.
(By courtesy of Messrs. Willen Bros., London.)

Normal Saline.—This expression is familiar to all who have had any hospital experience. The solution is supposed to imitate as closely as possible the weak sodium-chloride solution in which the tissues are bathed, therefore the strength is about ·9 per cent. For ordinary use it may be made by dissolving 80 gr. of pure common salt in a pint of hot distilled water. It may be boiled and cooled again before use. Tubes containing weighed tablets or strong solutions can be stored; they are quickly made into the required solution. By using the correct strength, we are sure that no destruction of the blood corpuscles can occur; the solution is said to be *isotonic* with the blood. The most useful and most convenient way to keep saline is to have a stock of standard fluid in tightly stoppered flasks. When required, a flask is placed in water at a temperature of about 110° F., and allowed to warm up to 100° F., when it is ready for use. The stopper should be slightly loosened.

Intravenous Infusion.—The greatest care should be taken over the asepsis of this operation, which is done by a qualified

medical man. The *preparations* for it only may be done by the nurse. In addition to saline, a solution of glucose and gum acacia, or gum acacia and sodium chloride, may be used.

Instruments Required.—Novocain solution (2 per cent.) all ready for injection in a sterilized hypodermic syringe; scalpel; dissecting forceps; artery forceps; dissector; aneurism needle; skin needle; ligatures of catgut and of horse-hair; gauze; cotton-wool; bandage; rubber tourniquet; jar of sterile gauze swabs; operating towels, mackintosh, rubber gloves; methylated spirit; iodine; kidney basin; clip; thermometer. The saline apparatus consists of a graduated glass funnel, connecting rubber tube, with special glass or metal needle fitted into a cannula.

The operation begins by a careful sterilization of the antecubital space. After the area has been locally anæsthetized, the tourniquet is fixed round the middle of the upper arm, and the median basilic vein is made prominent. When it has been identified, an incision is made, the vein is displayed, and the tourniquet is taken off. Two ligatures should now be tied round the vein, about an inch apart; the upper knot is not tightened, but the lower one must close the vein. The needle or cannula is then placed in the vein through a small opening, and the upper ligature is tightened over it to keep it in position. The greatest precautions must be taken to prevent air entering the vein; this is done by having the saline all ready in the funnel, and the tube and hollow needle full of fluid. The saline should be allowed to run in slowly, at the rate of about 2 pints in half an hour. The temperature of the fluid should be kept at about 110° F., as it cools down to 100° F. in the slow process of infusion. When all the fluid is used up, the needle is withdrawn, the upper ligature is securely tied, and two horse-hair sutures are put into the skin to close the wound, which is dressed with iodine and a dry dressing.

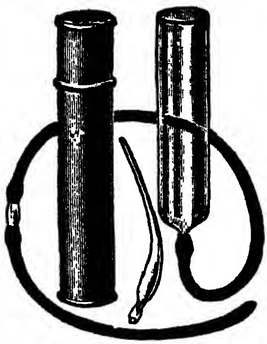


FIG. 104.—APPARATUS FOR SALINE INFUSION, NASAL FEEDING, OR RECTAL FEEDING.

(By courtesy of the Surgical Manufacturing Co., Ltd., London.)

Subcutaneous Infusion.—The fluid used may again be normal saline or dextrose (6 per cent.). Various sites may be chosen, the commonest being the area below the level of the nipples on the sides of the chest, but sometimes the abdomen is chosen, especially in infants, where the peritoneum forms a good absorptive area. On occasion, the intermuscular septa are suitable.

The apparatus required is such that infusion can be done simultaneously on both sides. A glass syringe barrel, holding about 2 oz. of fluid, is connected to a 12-inch rubber tube, at the end of which is a Y-piece of glass tubing, each arm of the Y being connected by short rubber tubes to special curved hollow needles which must be strong and sharp. The usual disinfecting supply is necessary, as described above. A flask of saline should be kept heated, as the infusion is very slow. The whole area is painted with iodine after being carefully cleansed with spirit. The needles should be passed in an oblique direction, and deeply. Having made certain that the needles are both full of fluid, so that no air is allowed to pass, clamp the supply tube, and put the needles in. Release the clamp; the fluid will pass comparatively quickly to begin with; the nurse must maintain a steady massage of the tissues all the time the fluid is passing so that it is absorbed by the cells. About half a pint of fluid is ample at each operation. It is advisable to cover the patient's skin, and to surround the funnel with cotton-wool. To begin with, the temperature of the first lot of fluid should be about 105° F., but when the saline begins to slow down, it may be necessary to raise the funnel temperature by another 10°, as cooling ultimately reduces the fluid to 100° F. It should take about an hour to give half a pint. After the needles are withdrawn, a thin gauze and wound-varnish dressing should be applied. The patient should be carefully observed in view of possible rigors.

Rectal Infusion.—The absorption from the rectum is very slow; therefore in many cases of shock, severe hæmorrhage, and

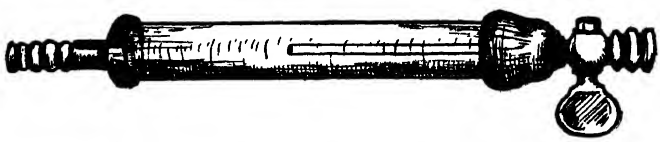


FIG. 105.—CANNY RYALL'S RECTAL TUBE.

abdominal inflammation, a continuous saline treatment by the rectum is given which may be in operation for about three or four hours. Water may be used, as it is more easily absorbed, but 6 per cent. dextrose may also be given. There are two ways of giving rectal infusions. The first is by the usual method of funnel, tubing, rubber catheter, and clamp. The fluid to be given is kept heated to about 106° F., and run in at the rate of 5 oz. per hour. The funnel should never be more than about 9 inches above the site of infusion. The catheter should be passed as far into the rectum as possible, and the fluid in the later stages may have to be warmed up to 115° F. as cooling goes on and the fluid

is absorbed more and more slowly. The second method is a better one, consisting of the vacuum flask, to which is attached a Ryall's drop tube, allowing the saline or other fluid to pass by regular drops. Otherwise the perforated glass rectal tube may be used. It should be passed about 3 inches into the rectum, and the flow should be fixed at the rate of 30 oz. an hour. This amounts to four drops per second.

Catheterization

A catheter is a steel, silver, plated, gum-elastic, or rubber tube with a blunt end having an inlet at the side, and is passed via the urethra in both sexes into the bladder. Urine can thus be removed when necessary, and quite distinctly from the normal passage by reflex action. Rarely will a female nurse be asked to pass a catheter on a male patient, since owing to the length of the urethra and the difficulties of its course, a doctor or male nurse almost invariably does this himself. But the female urethra is short and easily traversed, and there is little or no difficulty in emptying the bladder.

Passage of the Female Catheter.—A short rubber or glass catheter, free from cracks or obstructions, and carefully sterilized, is used. This, together with an enamel basin containing swabs in sterile water, a receiver for the urine, a bucket for soiled dressings, a mackintosh sheet and towel, is prepared. The one lesson that must be learned by nurses is that once microbes obtain a foothold in the bladder, they may settle down there for years, and make the patient's life miserable owing to chronic cystitis. Therefore it must be stressed that not only the instruments and appliances, but the patient's skin in the region of the urethra, and the hands of the nurse, must be scrupulously clean and free from all possible sources of contamination. In most cases two nurses are required to carry out the treatment successfully.

The best position for the patient is on her back, with the knees drawn up; one pillow is sufficient for the head. The mackintosh and towel are spread out below the buttocks. The thighs are placed conveniently apart, but in order to prevent cold, it is well to drape a blanket over each thigh.

To make sure of freedom from sepsis, the preliminaries are best done by the first nurse, while the second actually passes the catheter; but if only one nurse is available, she should never pass the catheter without vigorous cleansing of the hands after the area has been prepared.

The nurse should stand on the right of the patient, and with her left hand separate the labia majora, which are cleansed carefully. Following this the labia minora are similarly treated. The work must be done always from above downwards, so that

no discharge from the vagina or anus reaches the urethral orifice. A new pledget of cotton-wool, soaked in boracic solution, should be used at each stroke. The operation of inserting the catheter is done by taking the open end in the right hand, while the left keeps the labia apart. On no account should the point of the catheter touch the operator. If necessary, it may be dipped into sterile oil for a second. When the instrument is safely in the bladder, keep the finger over the orifice until the receiving dish is placed below it, then allow the urine to pass. After the bladder is empty, withdraw the catheter, and swab the external genital organs once more. In this procedure, the end of the catheter must also be closed with the point of the finger, otherwise the bed will be soiled. If a sample of urine is required, it must be saved. In some cases, nurses with experience can pass a catheter without exposure of the parts, relying as they do on the sense of touch. This is often of advantage in sensitive or nervous patients, but it requires skill and practice.

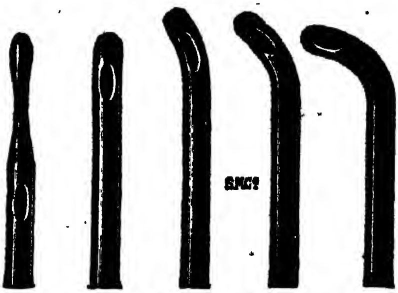


FIG. 106.—VARIOUS TYPES OF CATHETER.
Left to right: Bulbous, cylindrical, semi-coudé, coudé, bi-coudé.

(By courtesy of the Surgical Manufacturing Co., Ltd., London.)

Passage of the Male Catheter.—Male nurses, and especially those specializing in mental diseases, often have to pass a catheter regularly on their patients, indeed it is a *sine qua non*, for all who aim at the best type of work, that they should become expert at this procedure. In difficult or abnormal cases, of course, the doctor may be relied on to help or to give advice, but in the general run of practice, the male nurse may pass the catheter several times a day, and for weeks on end without the slightest untoward incident. What are the essentials, then, of efficient catheterization?

No matter whether the metal, gum elastic, or rubber catheter be used, the fundamentals are the same. In all these operations the most scrupulous care must be taken to ensure asepsis. The patient should be placed on his back, completely relaxed. If he is nervous or excited, the nurse must have patience, and by talking to him or generally giving him confidence, should ultimately get him into a state of complete relaxation, the thighs slightly separated, the knees drawn up, and the abdominal muscles soft. The general preparations of the patient and his bed are similar to those described above.

In many cases, the glans penis must be carefully prepared. The prepuce may be retracted and after preliminary cleansing with warm water and a non-irritating soap, the whole of the end of the penis should be swabbed several times with 1 in 80 phenol, or lysol, half a teaspoonful to the pint of water. A fair-sized square of gauze may be left on the glans for 20–30

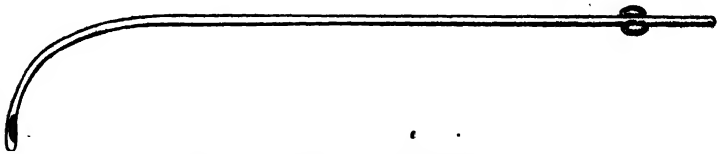


FIG. 107.—ALL-METAL CATHETER.

minutes before the operation is done. Many nurses do not go through such elaborate formalities, but it must be stressed that if a nurse takes risks and has a patient with chronic cystitis, he has only himself to blame.

Having carefully sterilized his own hands, and wearing, if possible, rubber gloves also free from germs, the nurse should then draw the penis slightly forwards and upwards, at the same time pulling back the prepuce to its limit; the whole of the penis

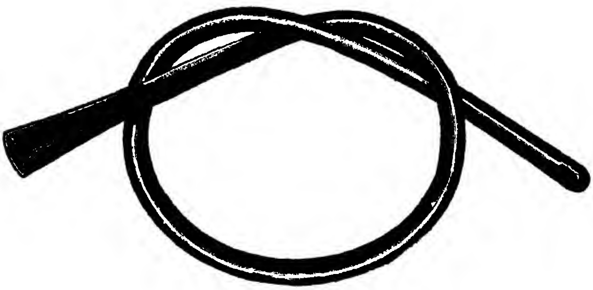


FIG. 108.—RUBBER CATHETER.
(By courtesy of Messrs. Willen Bros., London.)

should be in the left hand, and by doing this, the nurse makes certain that he can feel the catheter pass through the last portion of the urethra. The catheter, lubricated with jelly, may then be passed. There should be no force-work. If resistance is encountered, it may be due to spasm, so it is wise to wait for a few seconds. If the urethra obstructs the passage of the catheter, especially if a metal one is being used, the doctor should be summoned. The best results in catheterization are obtained not by the actions of the nurse but by the "receptivity" of the

patient. The nurse who is skilled knows what is meant by that. It connotes the trained hand of the male nurse who realizes that guidance and not power is required in all catheterization. As slight pressure is maintained, it will be found that the patient slowly "eats up the catheter" as the saying goes, and almost before the nurse realizes it, the urine begins to flow, and the so-called ordeal is over. The importance of learning how to pass the catheter cannot be over-emphasized; the nurse who is an adept may well be sought after. The rest of the treatment follows the routine as described above under the heading of *Passage of the Female Catheter.*

CHAPTER 11

LOCAL APPLICATIONS

FOMENTATIONS—SURGICAL AND MEDICAL. HOW HEAT AFFECTS DISEASED TISSUE. MEDICAL FOMENTATIONS. SURGICAL FOMENTATIONS. THE ICE-BAG. SPECIAL LOCAL APPLICATIONS. COLD COMPRESS. EVAPORATING COMPRESS. ICE POULTICE. LEITER'S COIL. BREAD AND LINSEED POULTICES. CLAY APPLICATIONS. STARCH POULTICE. MUSTARD POULTICE. TURPENTINE STUPE. MEDICINAL STUPES. COUNTER-IRRITATION.

In this chapter we deal with conditions which are circumscribed, i.e. confined to one region such as a limb, or part of a limb, the head, the chest, or the abdomen.

Fomentations—Surgical and Medical

The term " fomentation " means an agent which is applied to the surface of the body, and which, by the radiation of moist heat, accompanied or not by the action of a drug, has a certain effect on the underlying tissues. The application of fomentations is an everyday occurrence in hospital practice, and it is a favourite remedy which has been passed down to us from our grandmothers.

How Heat affects Diseased Tissue.—Underneath the skin is a fine, close network of minute blood-vessels running in all directions. These capillaries feed the tissues and keep the skin in a state of health. If there is disease, such as inflammation, it may be taken for granted that there is some poisonous element present which the blood is trying to eliminate. Heat has the effect of opening up the capillary vessels, and so the amount of blood to the part is raised to its maximum supply. We can assume, therefore, that when constant heat is applied to a certain part of the skin, the area so treated will become red and active-looking, because there is a rush of blood to the part. In inflammation there is congestion and an excursion of the various cells from the vessels, these acting as " scavengers " or as antidotes to the poisons which are present. It is obvious that a heating agent will maintain the increase of blood supply, and since this

allows the liberation of as many *leucocytes* as possible, there is a complete stimulation of all the powers of *repair*. In addition to this the muscles are relaxed, and the nerve-endings, which have been stimulated by the pressure, are soothed, and the pain is reduced to a minimum.

Medical Fomentations.—There are two main methods of applying moist heat, depending upon the use of *medical* fomentations or *surgical* fomentations.

The medical fomentation, also known as the *stupe*, is very useful when the muscles are in a state of spasm, or where inflammation has not gone on to suppuration. The regime of making and applying a stupe is as follows: the area to be treated must be exposed, and an estimation made of the amount of fomentation cloth required. Having made certain that the skin is free from any obvious impurity, and that there is no question of acute suppuration or abscess, the nurse should cover the patient with a thick blanket and then prepare the stupe. For this she takes three or four layers of flannel known as *fomentation cloth*, and cuts it to the proper size. A large enamelled basin filled with boiling water is then obtained, and the fomentation cloth is placed inside a stupe wringer, which is made of strong, thick towelling material, about 18 inches by 12 inches. The whole is then plunged into boiling water and twisted until the water is expelled. An improvement to the process is added if small hems are made on the ends of the wringer and cylindrical pieces of wood passed through; these act as handles and increase the twisting power of the stupe wringer. No time should be lost in removing the flannel, giving it a shake to expel the steam and then applying it to the area affected. Great care must be taken that the stupe is applied gradually and carefully to the patient's skin; it is a great shock to have a piece of hot flannel suddenly thrust on the chest or abdomen. At the same time, it must be ensured that as little heat as possible is lost, because the maximum output is required for the treatment.

Having fixed the fomentation in position, the nurse should then have ready a square piece of jaconette, which should overlap the stupe by at least 1 inch all round. Unless this is done, the whole function of the stupe is counteracted, because the jaconette cloth not only retains a very small amount of moisture in the flannel, but also prevents loss of heat. After the jaconette has been fixed, it should be covered over with several layers of cotton-wool and a bandage should be firmly fixed to keep the whole dressing in position.

The Use of Medical Fomentations.—In the ordinary way a stupe may be used where there is a spasm of muscles, painful stiffness, or general inflammation. It should be renewed as often as is necessary; sometimes it requires to be changed every twenty

minutes, but as a general rule, if it is well protected it can be left in position for at least two hours. Care should be taken that during the changing process the patient is not allowed to suffer chill, owing to the affected area being exposed.

Medical fomentations are often applied in chest troubles, especially at the beginning of bronchitis, and sometimes they are also of good effect when they are placed on the abdomen in cases of internal pain. The heat in this case has a *reflex* action, as it stimulates the nerves of the skin over the organ affected, and the message is transmitted to the brain and finally distributed to the area which is abnormal. It is not very clear how this action goes on, but experience proves that the application of moist heat, usually accompanied by drugs, is of splendid effect in the relief of acute symptoms, even of deeply placed organs.

It has always to be remembered that there are certain conditions which demand special precautions in the application of stupes. Just as a bed-sore may be caused by dropsy, or paralysis of sensation, and a burn by the application of a hot-water bottle too closely to the skin of a person unconscious or under an anæsthetic, so in all these conditions is a hot fomentation dangerous, and on no account should it be continued if there is any sign of breakdown of the skin. During these proceedings, it is essential to lose no time in placing the stupe on the affected part after it has been wrung out, therefore a basin should be placed at the patient's bedside, and all preparations completed before the fomentation is wrung out.

Surgical Fomentations.—The surgical fomentation is employed when inflammation has developed so much that there is suppuration. In this condition pus is gathering, and the sooner it is evacuated the better. A surgical fomentation softens the tissues and allows the pus to burrow through to the surface, where it is discharged. Even after discharge has begun, the surgical fomentation helps to soften the various incrustations and other hardened matter, which may form scabs on a wound; one of the commonest instructions given to a nurse who takes over a new case of discharging wound is to clean it up with a moist surgical fomentation.

There is not much difference in the composition of the surgical fomentation as compared with the medical fomentation. In the surgical fomentation the flannel is replaced by surgical lint, medicated or plain, and naturally, aseptic precautions must be taken to keep the dressings and instruments sterilized. To cover up a surgical fomentation, gutta-percha tissue (commonly called "G.P. tissue") is most frequently used, as it is waterproof and soft to the tender skin. The rest of the dressing is carried out in the same way as that of the medical stupe.

The Ice-bag

The application of cold is quite as common in medicine as the application of heat. While heat dilates the blood-vessels, cold contracts them and causes a local pallor of the skin. Strangely enough, it also has a very soothing effect on any area where inflammation or acute swelling is present. This is the reason why cold-water cloths, or cloths soaked in ice water, are good remedies for sprains and contusions. In a sprain there is sudden bleeding at the part affected, and the swelling is painful owing to great pressure. When a cold compress is applied, the arteries are contracted and the internal bleeding, as well as exudation from the blood-vessels, is controlled

Cold is also applied in various ways, but chiefly by the ice-bag when there is acute inflammation. Very often suppuration can

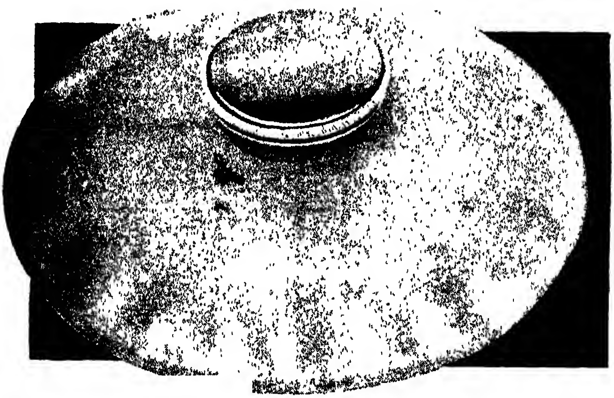


FIG. 109.—ICE-BAG.

(By courtesy of Messrs. Willen Bros., London.)

be stopped by a timely application of ice to the area affected. In pneumonia the ice-bag has long been known as an essential part of the treatment; applied over the affected lung, it prevents the spread of inflammation and generally controls the process.

In some types of acute diarrhœa and of intense irritability of the bowel, the ice-bag provides a speedy cure. In such cases the cold acts exactly in the same way as the moist heat described above.

The ice-bag in common use is usually a simple flat mackintosh or rubber bag with screw cap, but there are many other varieties. Before the ice is put into the bag, it should be broken up into pieces about the size of a walnut. A wooden bowl is the best

container, since wood is a poor conductor of heat. If the ice chips are too sharp, they can easily be rounded off by heating a spoon and stirring the pieces with it. Over them common salt is sprinkled, which makes the cold more lasting. The bag should be half filled and, as with the hot-water bottle, all the air can be excluded before the metal top is tightly screwed down in position. The skin should be protected by a layer of lint or flannel, so that it is not frost-bitten, If the patient cannot bear the full pressure of the ice-bag (e.g. on his chest), it can easily be hung from a cradle. After a certain point, the ice begins to melt very quickly, therefore the nurse must keep her eyes open and have another bag ready to apply. The whole effect of the ice is lost if the bag is left in position too long without replenishment. In some cases, a little vaseline is rubbed on the skin before the protective pad is applied.

Special Local Applications

In the following pages a summary is made of the chief forms of local application. It should be noted that certain procedures, e.g. leeching and cupping, have been left out; in the opinion of most authorities such items are the general nurse's concern.

Cold Compress.—This is used for the head, throat, or eye, and the success of it depends upon the steady maintenance of the low temperature at the affected spot. The nurse in charge must therefore be prepared to make frequent and rapid changes. For this reason, the compress is very lightly fixed by a single or double turn of a bandage, and there should be an enamel basin containing ice, set in a larger one containing a freezing mixture, at the bedside. To make an ice compress, a triple layer of surgeon's lint should be immersed in the ice-cold water in the basin. Without delay, it should be well wrung out and fixed over the affected part, covered with jaconet, and bandaged.

Evaporating Compress.—For this, only a single layer of lint is necessary, and it need not be covered, but it can be tied on, or fixed with plaster at the edges. Owing to the leakage of fluid, it is advisable to put a mackintosh covered by a towel below the part under treatment. The principle of this treatment is the maintenance of a cold area by the evaporation of spirit or other lotion; therefore a bottle of the lotion should be kept handy, and should be poured over the lint as soon as it loses its moisture. On no account should the lint be covered. This is the common treatment for headaches, a lotion being made up consisting of 25 per cent. alcohol in iced water, together with a little *eau de Cologne* or lavender water. Sometimes *lead* is added as a soothing element.

Ice Poultice.—In addition to the ice-bag there are several ways of applying cold to a part, but the principle of each one is the same—to keep the low temperature steady, and thus to repair and soothe bruised, inflamed, congested, or hæmorrhagic tissues. The value of the ice poultice is in its lightness It is very useful for application to the chest in cases of pneumonia, as it causes the minimum pressure. A square of gutta-percha tissue, a little more than twice the size of the region to be covered, is folded on itself. Over this is placed a layer, about half an inch thick, of absorbent wool, wood-wool, or splint-wool; a margin of gutta-percha tissue, about half an inch; should be left all round. Crush a quantity of ice into small pieces about the size of a Barcelona nut; spread the ice over one half of the wool, and sprinkle it well with salt. Fold the other half of the G.-P. and wool over the ice, and seal the three free edges with chloroform or turpentine applied with a camel-hair brush. When the ice requires renewal, it is a simple matter to cut the seal on one border with scissors, refill the envelope, and seal up again. Lint or flannel may be used to cover the poultice before it is applied to the part. In some cases linseed meal is used instead of wool.

Leiter's Coil.—Leiter's coil consists of lead tubing, lightly bound together by thin webbing. The more modern form is Thornton's Spiral Ice-bag. The coil can be moulded to any part, e.g. the head, for which it forms a kind of bonnet. The upper end of the tube is joined to a rubber tube which may be attached to a douche-can or dipped into a pail of iced water well above the patient. The lower part of the tube leads into a bucket which stands on the floor. To circulate the cold water, it is necessary to strip the upper rubber tube, allow the water to rush in, and then adjust the tap or clip. Circulation is a process of slow siphonage, and when the lower bucket is full, the buckets may be reversed if the water is cold enough. A strip of flannel should be interposed between the coils and the part under treatment.

Bread and Linseed Poultices.—The bread poultice and the linseed poultice are household stand-bys. The former runs the risk of being somewhat unscientific, and it soon cools. To make a *bread poultice*, the bread should be crumbed, soaked for a few minutes in boiling water, and then applied to the skin, which has previously been covered with a thin layer of vaseline to prevent the bread from sticking. The poultice should be covered with flannel.

The *linseed poultice* may be used alone or with a sprinkling of mustard. For this, the following are required: a poultice board, spatula, enamel basin, enamel jug containing boiling water, two hot plates, wringer, poultice cloth, gauze, wool, jaconette, binder, safety-pins, supply of linseed, and kettle of boiling water. Need-

less to say, many of the above items are omitted in the hurry of a domestic application, but they are all necessary to make the perfect linseed poultice. Everything should be as hot as possible, in order to avoid heat loss. Linseed meal in which the seeds are crushed to a fairly fine granular powder is the best agent. A quantity of boiling water is put into the basin, and the linseed meal is added in a way similar to that adopted in making oatmeal porridge, the spatula stirring it all the time. When a thick paste has been obtained, generally in the proportion of three parts of linseed to one of water, the mass should easily come away from the sides of the basin, and should cut clean like soft putty. It is important to have the right consistence, as linseed contains valuable oil, and its heating properties are at their best when the poultice is not too soft. The cloth on which the poultice is to be spread may be of flannel, linen, or teased tow, the last carefully pulled out until it forms a thin pad.

The paste is transferred to the cloth on the board, and the hot spatula is used to spread out an even layer, about half an inch thick and extending to within an inch of the margin of the cloth all round. Gauze may be laid over the upper surface, and the edges should be folded in; then the poultice should be wrung out in order to get rid of the surplus water. In many cases, the water may have to be pressed out with the hand. Take the poultice to the bedside between hot plates, and apply it as hot as the patient will bear; he usually objects at first, but gradually becomes used to the heat, especially when it is explained to him that the hotter the poultice the better will it have effect. It is well to rub the skin previously with a little boro-vaseline. In changing poultices, the nurse must remove the old one quickly and apply the new one at once, so that the area does not become cold. A thick layer of warm cotton-wool can be applied temporarily. The poultice may be retained in position by flannel binders or bandages, applied over cotton-wool and jaconette similar to that of the medicinal stupe (see below). Generally speaking, a poultice should be left on for four hours, but in many cases the change is made more frequently, especially if the condition is acute.

Clay Applications.—Certain proprietary preparations are made which contain warming agents, such as methyl salicylate, glycerine, camphor, and pultaceous clay. *Antiphlogistin* is an example. The mass is heated by putting the tin in a basin of boiling water, then it is applied in exactly the same way as linseed, but it may be left on for twelve hours or longer, well covered by flannel, wool, and a bandage. It is advisable to keep a hot-water bottle, changed frequently, over the site of the poultice. After removal of the clay, the skin should be cleansed with soap and water.

Starch Poultice.—Eczema may demand the application of starch poultices for twenty-four hours, so that the crusts may be removed. There are various ways of making the paste for this poultice, but, as a general rule, up to 2 oz. of cold-water starch should be gradually added small quantities of water until a fairly thick cream is produced. Into this may be put a teaspoonful of finely powdered boracic acid if necessary, and then one pint of boiling water is quickly stirred in, the mixture being kept in motion until the clear jelly is obtained. After cooling, the starch may be applied in exactly the same way as the linseed poultice, and can be left on for a night. In severe cases, fresh poultices may be put on every four hours.

Mustard Poultice.—This must be distinguished from the linseed poultice over which a thin sprinkling of mustard has been made to give it a little "fire." The mustard poultice contains anything from 1 part of mustard and 5 parts of linseed to 1 part of mustard and 9 parts of linseed. Linseed is prepared for a poultice in the usual way. The quantity of mustard required is made into a paste with tepid water, and then carefully mixed up with the linseed. The skin must be well rubbed with boro-vaseline, and a layer of gauze should be interposed between the poultice and the skin. The time of application is never greater than twenty minutes, and after the poultice is removed it is necessary to dust the skin well with talcum powder and to protect it with cotton-wool for a few days. This is a typical *rubefacient*, and it should not blister, but a deep red blush should mark the site of the poultice for some hours. Care should be taken that the mustard is completely removed, as a local and general effect may be caused by the leaving of a few grains which give rise to a very irritating oil when left damp in the air.

Turpentine Stupe.—This is a medical fomentation to which is added half an ounce of turpentine for an adult, and about half a teaspoonful for a child. The turpentine forms a film on the surface of the water; therefore as the stupe is carefully withdrawn, it can spread itself in an even layer on the flannel. In some cases, the flannel is wrung out in turpentine water, or sprinkled first. Care must be taken to ensure that the reaction is not too great; therefore it is the duty of the nurse in charge to lift up the edge of the flannel after three minutes and find out if there is any undue reddening of the area. In any case, a turpentine stupe should not be left on for more than half an hour in an adult and ten minutes in a child. This is a very important point, as the turpentine stupe is often employed to relieve abdominal pain, and the skin of the abdomen is very sensitive. After the stupe is taken off, it ought to be followed by a plain hot medical fomentation or by hot dry wool.

Medicinal Stupes.—These are frequently applied in general practice to soothe a painful sprain, etc. Opium, lead and opium, or belladonna are commonly used drugs. The stupe is first wrung out in hot water, then $\frac{1}{2}$–1 drachm of tincture of opium, lead-and-opium lotion, or tincture of belladonna is sprinkled on the flannel, after which the fomentation is applied in the usual way. In some cases, a special pattern of flannel must be cut to fit the affected part, or a succession of small squares applied until the whole area is covered.

Counter-irritation.—The method of treatment by counter-irritation increases the circulation at a part, and relieves pain. The common method of production is by *blistering*.

There are many ways of producing blisters. When a blister, or a "fly blister," is referred to, the official pharmacopœial agent is meant, viz. cantharides, the active principle of Spanish fly. This substance can be used as a plaster or as a blistering fluid. In the former case, the skin is carefully cleansed, shaved if necessary, and all traces of grease are removed by alcohol or ether. Then a circular disc of the plaster is cut according to the area for which it is required; most plasters are marked in 1-inch squares, which is usually quite enough for the irritation desired. Suppose we wish to put a fly blister on the knee in order to relieve effusion. The skin is prepared, a site being selected at the side of the joint and on a *fleshy* rather than a *bony* part. The plaster is put on, and the covering of thin cotton-wool is lightly and loosely fixed by adhesive plaster, so that there is room for the blister to rise. If after six to eight hours there is no blister, a hot fomentation may cause it to rise.

There may be orders to leave the blister unpunctured, in which case it is treated by dry dressings until the fluid is absorbed, and the skin can be peeled off in a few days. In most cases, however, the bleb is punctured at its lowest part with fine sterile scissors, and the fluid may be saved for examination. The punctured blister may be dressed regularly with zinc ointment or with sterile gauze. In extreme cases, the whole bleb is cut away and dressed with savin ointment.

When the blistering fluid, officially known as *liquor epispasticus*, is used, the area is encircled by a ring of vaseline, and the paint is applied in two coats. When dry, it is dressed in the usual way. Care should be taken that the paint is completely removed before the blister is punctured. Cantharides is contra-indicated in kidney disease.

Blisters can also be produced by ammonia, glacial acetic acid, salicylic acid, and chloroform. In most cases the substance is applied on lint, and kept covered by a watch-glass tightly strapped on to prevent the escape of vapour.

CHAPTER 12

GENERAL APPLICATIONS

COLD AND HOT BATHS. TYPES OF BATH. COLD BATH. TEPID BATH. WARM BATH. HOT BATH. SPONGING. COLD SPONGING. HOT SPONGING. PACKS. COLD PACK. ICE CRADLING. HOT WET PACK. MEDICATED BATHS. MUSTARD BATH. SULPHUR BATH. STARCH BATH. ALKALINE BATH. IODINE BATH. MERCURY VAPOUR BATH. CONTINUOUS BATH. FOOT, ARM, AND HIP BATHS. MASSAGE AND RE-EDUCATIVE MOVEMENTS.

THE subject of bathing has already been dealt with as it affects the patient who is bathed as a routine. We must now consider bathing from the point of view of therapeutic effect, and learn how hot and cold water, ice, heat, and vapour are used in certain diseases.

Cold and Hot Baths

From a purely hygienic point of view, the hot bath is a *cleansing* agent, removing the fine layer of germ-laden grease which quickly gathers on the skin. Baths may be used at various temperatures, and in some cases certain drugs may be added. Other functions of the bath are the adjustment of the *temperature* of the body, the stimulation of *perspiration*, *soothing* and *tonic* effects, relief of *pain*, and the inducing of the desire to *sleep*.

Types of Bath.—Four main types of bath are described according to the temperature:

1. Cold bath—50°–70° F.
2. Tepid bath—80°–90° F.
3. Warm bath—90°–100° F.
4. Hot bath—100°–110° F.

Cold Bath.—To plunge a nervous or very sick patient into a cold bath is at any time a dangerous proceeding; even in health, cold baths cannot be tolerated by all, and it is ridiculous to read of and hear some of the dictums expressed so forcibly by so-called Spartans, who sneer at the "weakness" of those who are constitutionally unsuited to sudden changes of temperature.

In certain very well-established febrile conditions, baths at a temperature of from 50° to 70° F. may be ordered by the physician, but the nurse should ascertain carefully before treating her patient how long the patient is to be left in the bath, as a few minutes over the approved period may cause serious after-effects. It is not advisable that a fevered person should be taken to the bathroom, therefore a full-length portable bath of zinc or enamel may be brought to the ward, and placed at the foot of the bed. Having poured a few jugs of water into it at a temperature of 70° F., the nurse carefully checks the bath with a thermometer; it may have cooled down to 60° F., but this may be the temperature ordered. The bed-clothes are stripped off the patient, and he is given a small Turkish towel to use as a loin-cloth. To make the shock of the bath as mild as possible, a careful cold sponging is done all over the head and neck, then with a nurse or assistant at each corner, the sheet is carefully lowered into the bath with the patient on it. The initial reaction is brisk; there is certain to be shivering and active gasping for breath, and not unlikely voluble protests against an apparent act of barbarism, but these demonstrations soon pass off. The nurse should massage the skin as vigorously as possible while the patient is under water, and should try to keep the water in motion. After about ten minutes or less, depending upon the pulse, the onset of cyanosis, or a rigor, there is placed over the bath a warm towel or blanket, preferably the latter. Leaving the sheet and the loin-cloth in the bath, two nurses lift the patient, covered by the blanket, on to the bed, over which has been placed another warm blanket. He is quickly dried between blankets, and returned to his normal position in bed. It is advisable to keep a watch for any untoward symptoms. If collapse threatens, hot-water bottles, stimulants, and rubbing down with a hot towel may be indicated.

Tepid Bath.—This is really a modified cold bath, and it may serve the same purpose, as it can be cooled when the patient has become accustomed to the drop in temperature. It is soothing to the nerves. Bathing can be carried out exactly as above, except that the initial temperature is 90° F., and this is slowly but steadily reduced by adding cold water, or better, large pieces of ice which are quickly passed backwards and forwards in the water until the temperature falls a few degrees. Twenty minutes should be the time limit, and it is quite long enough to reduce the tepid bath to the cold-bath level.

Warm Bath.—When the water is at a temperature round about 95° F., the bath is both cleansing and soothing, and gives relief from pain. It is probably the most popular type of bath, and is useful in convalescent states. A brisk rub-down afterwards promotes good circulation.

Hot Bath.—If the bather does not prolong his stay in the hot bath, it is stimulating and health-giving, raising the temperature and inducing the maximum perspiration, which ensures riddance of all harmful excretory matter. It is very satisfactory if the patient goes to bed immediately afterwards and maintains the temperature by hot-water bottles and blankets. He should never be allowed to remain in the bath longer than ten minutes. In certain cases, it is advisable to start the bath at 100° F. and gradually raise it to 110° F. If the hot bath is given for sleeplessness, it should be arranged that the patient remain in it for five minutes, or until the water has time to produce its maximum effect, then he should be put to bed between blankets, and given a hot drink.

Sponging

In many cases it is advisable that the patient should not be taken out of bed, and therefore sponging, either for cleansing or for medicinal purposes, is resorted to. The "blanket-bath" has already been described. Other methods of sponging are as follows.

Cold Sponging.—Sponging with cold or tepid water may be done when the temperature rises to a height of 105° F. or higher. By this method it is possible in some cases to reduce the temperature by 2° F. There is no generally accepted method of cold sponging adopted as a routine; indeed, various hospitals have different methods, but the aim is to lower the temperature as quickly as possible and with the least discomfort to the patient.

The following procedure may be accepted as a reasonable method, but it may be modified according to the circumstances in which the nurse is placed. The undermentioned things should be collected—one long mackintosh sheet, two bathing blankets, water at 65° F. in a large basin, smaller basin to which ice is added, compresses for the head, hot-water bottles for the feet, and a sponge slightly bigger than a cricket-ball. In certain cases, it may be possible to provide half a dozen sponges, which can be used for the head, nape of neck, axillæ, and groins.

The waterproof sheet is laid on the bed, and is covered by a bathing blanket. Then the patient is put on the blanket, and covered with the second one. The personal garments are removed, and a hot-water bottle is put at the feet to promote circulation. During this time, the temperature should be taken. After the thermometer has been checked, a cold compress should be placed on the head; this avoids headache, by preventing rush of blood to the brain. Some authorities recommend that the body be sponged quickly with hot water

before the cold sponging begins. This is very soothing when the skin is dry and hot, as in fevers.

The principles governing the application of the cold water are: (*a*) constant adjustment of the water, by adding ice, so that the temperature of the water remains at 65° F. or is allowed to become cooler when the patient can stand greater cold; (*b*) regular supply of a film of cold water to the trunk, and later to the limbs. Those who advocate the sweeping strokes with an almost-dry but cold sponge do not appear to appreciate that the temperature is more quickly reduced if the water is really "spread" over by gentle circular stroking with a saturated sponge frequently replenished. The blanket below the patient becomes very wet, and in some cases to prevent a sloppy mess in the room, the nurse may have to devise an artificial trough in the bed, made by rolling up blankets at each side of the patient, and covering them over with mackintosh sheeting or towels.

If sponges are available, they should be transferred, dripping with cold water, to the regions mentioned above, and occasionally replenished during the operation. It must be remembered that the body is hot, and the thin film of water over it is quickly raised in temperature. To begin with, the upper blanket may be turned down as far as the groins, and the sponging is carried out continuously for about ten minutes, the nurse passing the sponge, which she squeezes lightly, all over the arms and the front and sides of the chest and abdomen. This may reduce the temperature, but if it does not, the lower limbs may have to be treated in the same way, with sponges in the groins and behind the knees. The patient may have to be turned over so that the back is treated, but it must be remembered that the minimum of movement must be allowed, and the patient should on no account attempt to assist or to exert himself. In drying the patient, there should be no vigorous rubbing; if the mackintosh and blanket are removed, and a dry towel slipped below him, the surplus water will be absorbed, and the rest of the body can be dried by patting the skin with a towel rolled up into a pad. The skin may then be powdered, and the patient is covered with a blanket and sheet. The temperature is taken immediately; if it is down more than 4° F., the nurse must make arrangements to prevent collapse, and may have to add a second blanket and hot-water bottle. Febrile patients appreciate a cool drink after all this, especially milk. The temperature should be taken twenty minutes after the sponging is completed; a record is kept of this.

If the whole body is exposed at one time, the procedure should take ten minutes only, but when the trunk and limbs are treated separately, twice that time may be necessary. In carrying out this form of treatment, the nurse must use her common sense.

Every patient varies. In some the temperature is apparently reduced after a few minutes; in others the whole of the work seems to be of little help. It is wise to stop sponging too soon than too late. If the pulse becomes weak or the face cyanosed, it is time to put the patient between blankets. This method is often used in typhoid fever, and it has very good effect in reducing the temperature at the critical time.

Tepid sponging, without many of the above formalities, is very often used in the course of ordinary nursing routine, and it is very much appreciated by people who have perspired a good deal, owing to pulmonary tuberculosis or to the various low types of fever, which leave the skin clammy and sticky.

Hot Sponging.—Sometimes when the rash of an infectious fever will not "come out," hot sponging with water at about 110° F. is done. The principle is the same as that of the hot bath, viz. the superficial blood-vessels are fully dilated, the maximum volume of blood is spread over a wide cooling area, and the temperature is lowered by the exposure.

Packs

A pack is a huge fomentation applied, hot or cold, to the whole surface of the body for various conditions.

Cold Pack.—This may be made by applying a sheet, wrung out in ice-cold water, and sometimes with pieces of finely crushed ice enclosed, to the patient. It is especially valuable in cases of heat-stroke occurring in very hot weather.

The bed is prepared in the usual way by putting a mackintosh sheet covered with a bathing blanket below the patient, who is stripped and supplied with a loin-cloth. A plentiful supply of crushed ice and a tub of cold water should be available. There are several ways of applying the cold sheet; two may be used, each folded into a square, thus forming four-ply pads; after being wrung out in ice-water, they are applied, one below the buttocks, reaching as high as the axillæ, and as far down as possible, and then folded closely to the body, leaving the arms free, the other over the abdomen and chest and *over* the arms, to be tucked behind the neck and close to the spine all the way down the back. The patient is thus completely enfolded in a casing of cold linen or cotton.

A simpler way is to lay him on a double-folded draw-sheet, or bath towel, wrung out in ice-cold water, and then to cover him completely with a similarly treated sheet folded once in the long axis and applied lengthways. The feet may be left bare, but often shivering is so great that it is better to apply a hot-water bottle to them. The head should also be covered with a cold compress. The sheets may be replaced every five minutes, but

the treatment need not go on for longer than twenty minutes. It may be found more suitable to sprinkle the patient with iced water from a watering-can or to apply ice to the upper sheet by rubbing a block backwards and forwards. When possible, he should lie covered by a blanket. After-treatment consists of gentle drying between blankets, and then return to ordinary bed. The temperature should be taken twenty minutes after the treatment is completed. It is advisable to have brandy or *sal volatile* available, as collapse may occur. Cold packing is used occasionally in *delirium tremens* to induce sleep, but since the patient must not be disturbed, he is left in the pack for half an hour or longer, well wrapped up in blankets, until he falls asleep soundly.

Ice Cradling.—Simple cradling, in which the lower part of the body is covered by a blanket and a cradle covered by a sheet is placed over the thighs and legs, is not so much used as *ice cradling*, the routine of which is as follows: The upper bed-clothes are removed; the patient's feet and legs are wrapped in a single blanket, and over the body a bridge of cradles (two may be sufficient) extends from the chest to the toes. Cold compresses are applied to the head, and a hot-water bottle to the feet. Inside the cradle is hung a thermometer, and several ice-bags, covered with lint to prevent dripping. The patient is then enclosed in a well-ventilated tent, made by draping a sheet over the cradles, with a space left for ventilation at each side or at the foot. The upper part of the sheet may be tucked round his chest. Except for the blanket round his feet, he should not have any clothes. The thermometer is carefully checked at intervals to ensure that the temperature of the cradle is satisfactory, and the temperature of the patient should be taken every half-hour. This treatment may go on for three or four hours, provided the patient is improving and not feeling uncomfortable.

Hot Wet Pack.—Owing to the powerful extraction of waste products induced, the hot wet pack is a common remedy in acute nephritis, in which the kidneys have ceased to do their work. The principle of the application of this great hot fomentation is the same as that of the cold pack, except that hot water is substituted for cold, blanket material for sheeting, and the patient is covered with a waterproof sheet. Generally speaking, the following are required: two mackintoshes; supply of warm blankets; two thin old blankets for the fomentation; hot-water bottles. A blanket is placed below the patient, who is stripped, then a mackintosh sheet, then another blanket. Hot-water bottles are applied to the feet, and a cold compress to the head. The two fomentation blankets are then saturated with boiling water, wrung out quickly, and then immediately applied below and above the patient as in the cold pack; the waterproof

sheet and under blanket are then folded over the fomentation blanket. The second mackintosh sheet covers the patient completely; over it can be placed several blankets, tucked in below the under blanket. The patient is thus literally swathed in blankets; these retain the heat, while the moisture is prevented by the mackintosh sheet from evaporating and chilling the patient. During the treatment, hot drinks of various kinds should be given, lemonade or mineral water being best. Hot-water bottles should constantly be supplied to maintain the heat of the application. The pulse-rate must be checked constantly, and stimulants should be at hand in case of collapse. Normally about three-quarters of an hour is sufficient for the treatment, after which the patient is put between hot, dry blankets for another hour. When returned to his normal position in bed, he should be well rubbed with hot towels, and provided with a warm gown.

Medicated Baths

The complete science of bathing is called *Balneology*, and it embraces many highly specialized types of bath which require special apparatus. The following are the simpler medicated baths.

Mustard Bath.—All mothers know the value of this bath in cases of chill or cold, and especially in the treatment of convulsions and other fits in children. The mustard bath may also be given for vomiting and diarrhœa. The temperature of the bath should be about 100° F., while the mustard, the allowance of which is 2 to 4 dessertspoonfuls to the gallon, is made up to a fine paste with tepid water, and then stirred into the bath. For children, five to seven minutes' immersion is sufficient; adults may use the mixture as a foot-bath over a longer period.

Sulphur Bath.—This is used in skin diseases, especially scabies, or itch, the treatment of which is fully described later. The strength of *potassa sulphurata*—" liver of sulphur "—is about 4 oz. to 30 gallons of water at 105° F., but the sulphur must first be dissolved in a quart of boiling water, and then stirred into the bath.

Starch Bath.—For this, 2 lb. of wheaten starch are added to cold water until a paste is formed by the burst granules, then the paste is stirred into 30 gallons of warm water.

Alkaline Bath.—This may be used for ordinary cleansing purposes, and it is unwittingly used by many who add a cube of bath salts to their daily bath. Care must be taken that the carbonate of soda (washing soda) is not too strong, otherwise it may cause peeling of the skin. Usually 1 oz. of washing soda to every 4 gallons is ample, and it is efficacious in all rheumatic

conditions. The water must be kept hot, as the patient must remain in for a considerable period to obtain the best effect.

Iodine Bath.—A drachm of *liquor iodi mitis* (B.P.) added to a gallon of warm water forms a soothing and healing lotion for extensive ulcers of the leg or arm or for large erosions of the skin.

Mercury Vapour Bath.—In this bath, the patient sits on a chair, and calomel, heated in a small container over a spirit-lamp, is placed below the chair. The patient is best enclosed in a light non-inflammable cabinet of asbestos. The calomel is deposited in a fine powder over the skin and left there for some time, the patient, who has been put back to bed, lying quietly, clad in a cotton gown.

Continuous Bath.—This is sometimes used for patients with nervous debility, who are kept for half an hour in a bath the temperature of which is constantly kept at 100° F. by adding hot water regularly. The nurse or male attendant should remain with the patient all the time. For severe and extensive burns, a patient may have to " live " in this type of bath for a few days. Air-cushions and other supports for the head and neck are arranged, so that the patient lies comfortably. The bath can be covered over by a blanket and waterproof sheet, and every twenty minutes or so a certain amount of water is allowed to flow out, while fresh hot water is added, thus maintaining a steady temperature. This demands special nursing service, as the patient is also helpless, and has to be taken out of the bath several times a day to pass urine, etc. Advantage should be taken of his absence from the bath to empty it, rapidly clean it, and refill it.

Foot, Arm, and Hip Baths.—The two former are used, generally with boracic acid, to provide continuous lavage for burns, accidental lacerations, and septic wounds. All kinds of

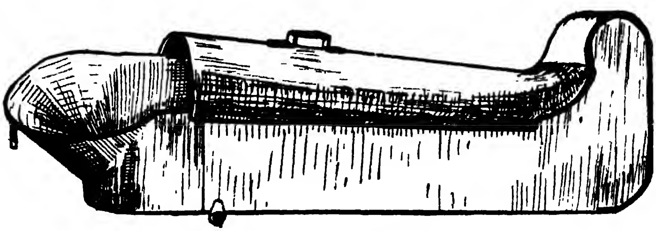


FIG. 110.—LEG BATH.

metal containers are provided. The bath should be arranged so that the patient has the maximum comfort, and has no difficulty in keeping the limb securely in it. The lotion should be changed every hour. Hip baths (also known as Sitz baths)

are used when there is inflammation of the pelvic organs; this form of treatment is very soothing in acute piles, and in all painful menstrual conditions. Water temperature of 105° F. is most satisfactory. Whilst the patient is in the bath, a blanket should be draped round his shoulders, and should hang down

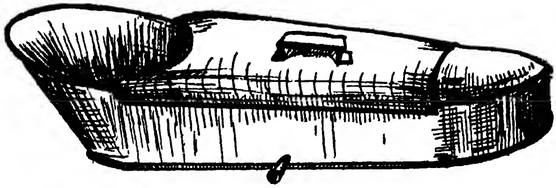


FIG. 111.—ARM BATH.

to the floor; another blanket is packed round the feet. This ensures that the patient is warm and that the bath retains its heat as long as possible.

Massage and Re-educative Movements.—Within recent years, there has developed the opinion among medical experts that massage and passive movements belong to a category which involves special training. The Chartered Society of Massage and Medical Gymnastics grants certificates to men and women who have passed the approved examinations, and as this demands a thorough course of training in a recognized institution, there is a growing belief that all such forms of treatment should never be carried out by the general or mental nurse. Most hospitals, and especially mental hospitals, have up-to-date and fully equipped massage and electrical departments; indeed this is one of the most essential factors in the patient's recovery. Naturally the staffing of such departments is done by those who hold the C.S.M.M.G. and other certificates.

Accordingly, it is now most unusual for mental nurses to be asked to perform the various types of massage treatment, and as a rule the patient is sent to the medical electrical department for it, or in certain cases, the masseur or masseuse is brought to the bedside of the patient who is not able to walk.

Re-education now comprises many forms of application. There is a strong tendency to form re-education departments in connection with many of the mental hospitals, and the subject of occupational therapy is one of the most important in the routine. The latter is fully discussed at the end of this work (see Vol. IV).

CHAPTER 13

DRESSINGS AND INSTRUMENTS

REQUIREMENTS FOR SIMPLE WARD DRESSINGS. FURNITURE. WARD INSTRUMENTS. WARD DRUGS. DRESSING OF WOUNDS. THE NURSE'S DUTIES. ROUTINE OF WOUND DRESSING. CLEANING AND STERILIZING INSTRUMENTS. CARE AND STERILIZATION OF CATHETERS. THE PREPARATION OF DRESSINGS. ASEPTIC DRESSINGS. ANTISEPTIC DRESSINGS.

EVERY surgeon has his own methods of treatment; these persist even to the very way in which the safety-pin is put into the outside bandage. It is therefore impossible to be dogmatic about the form which a dressing should take. The function of any dressing is first to make the healing surface clean and as free from germs as possible, secondly to apply some antiseptic that will prevent germ-activity in the region of the wound, and thirdly to cover the affected area with protective layers which will avoid mechanical and other influences from interfering with the steady progress of mending that must be encouraged.

The mental nurse does not as a rule have much surgical work to do. In the emergency of attempted suicide, or of the accidents that may happen to mentally afflicted persons who are not responsible for their actions, the lesions usually come within the category of first-aid, and thereafter the treatment is under the supervision of a specialist surgeon in a different part of the hospital, or at any rate the case does not belong to the usual regime of the ward for the time being.

Apart from major surgery, however, there are numerous minor ailments—septic spots, sore eyes, various skin affections, cuts, scratches, small lacerations—constantly recurring in the wards, and the mental nurse must have the fundamentals of treatment clear in her mind.

Requirements for Simple Ward Dressings

The following is a brief outline of the equipment usually provided for surgical wards. It is obvious that every hospital has its own methods and its own list of instruments and dressings,

but the articles mentioned below can be added to as circumstances require.

Furniture.—The first essential in ward furniture is a dressing-wagon, which usually consists of a framework of steel, plated or painted white, and provided with two plate-glass shelves. It also has rubber-tyred castors, so that it can be moved about easily and noiselessly. There are numerous types of wagon, depending on the kind of work that is being done.

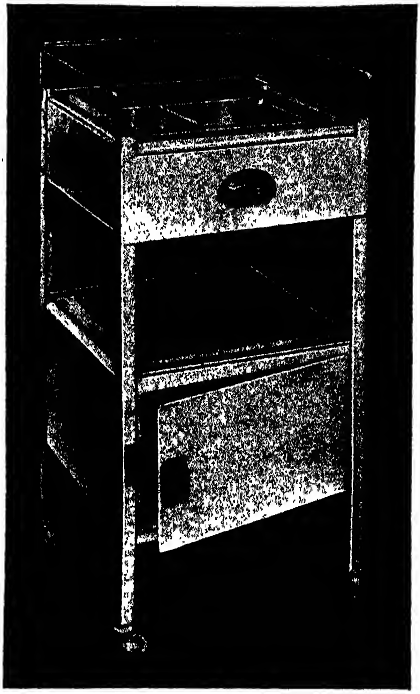


FIG. 112.—SIMPLE DRESSING TROLLEY ON RUBBER CASTORS WITH TWO GLASS-TOPPED SHELVES, DRAWER, AND CABINET, THE WHOLE PROVIDING A COMPACT VEHICLE FOR THE TRANSPORT OF DRESSINGS, INSTRUMENTS, AND APPLIANCES.

(By courtesy of Messrs. Willen Bros., London.)

On the upper shelf is usually placed a drum, square or round, made of copper and heavily nickel-plated. Many have neither seams nor corners. Inside this drum are all the dressings required for one patient; these have been sterilized within the previous twenty-four hours, and the drum must not be opened until immediately before use. A small square enamelled tray may also be included; on this is placed a pair of sterilized rubber gloves and a mackintosh square. There are also one or two circular enamelled basins containing the lotions in common use, and a tray of instruments in an antiseptic lotion. A glass jar is usually provided, into which will be placed dirty instruments; this should be about half full of 5 per cent. phenol. Another fairly tall glass jar should be three-quarters full of strong disinfectant; in this are placed the blades of a pair of large forceps used for the removal of dressings from the drum. There should also be a tray for dirty dressings, and a kidney-shaped tray for the reception of any discharges, rubber tubing, plugs, etc., which may be removed from a septic wound. A supply of

Fig. 113.—Stainless Steel Kidney Basin.
(By courtesy of Messrs. Willen Bros., London.)

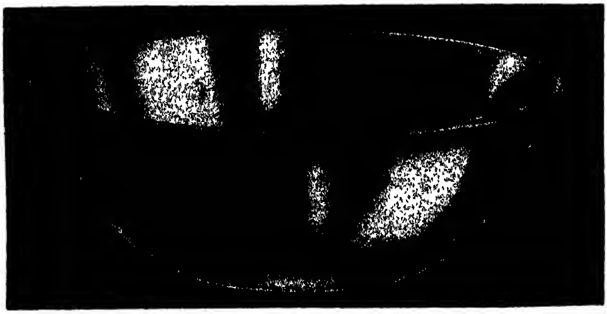


Fig. 114.—Stainless Steel Lotion Bowl.
(By courtesy of Messrs. Willen Bros., London.)

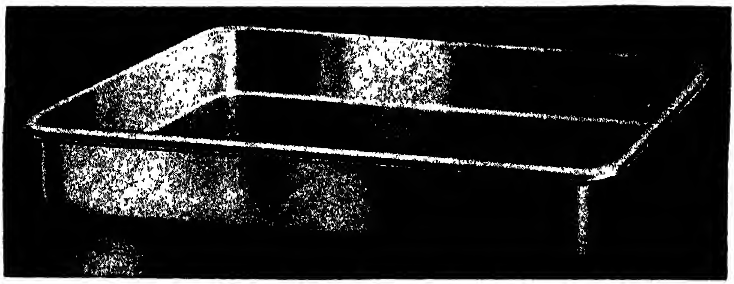


Fig. 115.—Stainless Steel Instrument Tray or Dish ; Seamless.
(By courtesy of Messrs. Willen Bros., London.)

bandages and safety-pins should also form part of the furniture of the wagon.

An enamel bucket with cover is usually provided for soiled dressings.

If hot water is laid on in a ward, there is no necessity to introduce facilities for sterilization of the hands before or between dressings. In the absence of this, however, there is usually a table provided with a plate-glass top on which are several large enamelled basins, a supply of hot water in an enamelled jug, stoppered bottles containing various antiseptic lotions, ethereal soap, and a scrubbing brush which is kept in 5 per cent. phenol lotion in a glass jar.

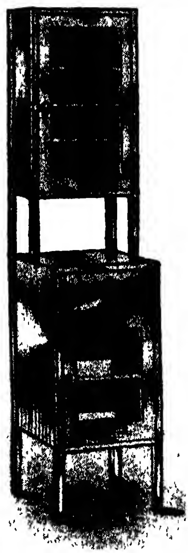


FIG. 116. — STEEL DRESSING CABINET FOR USE IN THE WARD.

This cabinet has the advantage of being durable with no sharp edges and having soundly welded legs.

(By courtesy of Roneo Ltd., London.)

Whenever possible, all the above appliances must be thoroughly sterilized immediately before use.

Ward Instruments. — The instruments in common use are illustrated in the following pages and usually consist of:

Surgical Scissors. — There are scores of patterns, but the most useful type for doing ward dressings is Mayo's scissors, nickel-plated, and with rounded blades.

Dressing Probe.—This is made of silver or of white metal, one end blunt and rounded, the other end slightly flattened, and with an eye.

Dissecting Forceps.—These are of stainless steel, and are made also in many varieties. Probably the type illustrated is the most useful.

Dressing Forceps.—These are for removing dressings, and may be provided with or without a catch.

Sinus Forceps.—These are also made of stainless steel with straight or curved blades which can easily be introduced into a deep wound.

Artery Forceps.—Numerous varieties are available for selection, but the favourites are Spencer-Wells's and Kocher's.

Bowl Forceps.—See illustrations.

Tourniquets.—These are used in emergencies when sudden bleeding occurs, and therefore they should be as simple as

possible. The patterns recommended are Foulis's, Esmarch's, or Samway's.

Sponge-holders.—These are made either with wire loop handle or, as illustrated, as forceps with wide-open blades.

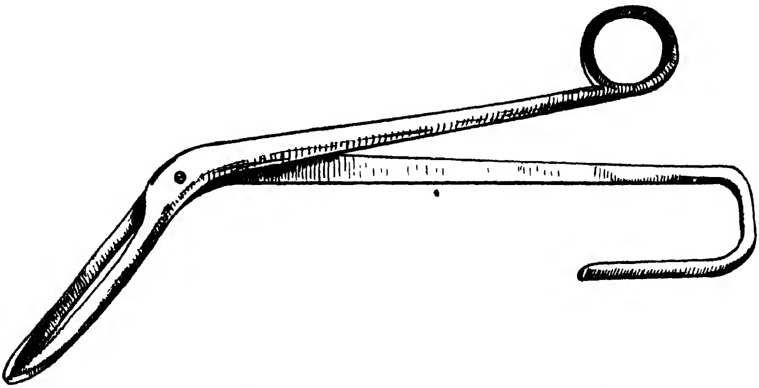


FIG. 117.—BOWL FORCEPS. (London Hospital pattern.)

Syringes.—Hypodermic syringes of various sizes, 1 c.c., 5 c.c., 20 c.c., and 50 c.c., should all be provided, and should preferably be of the all-glass variety.

Tongue Depressor, of glass or of nickel steel.

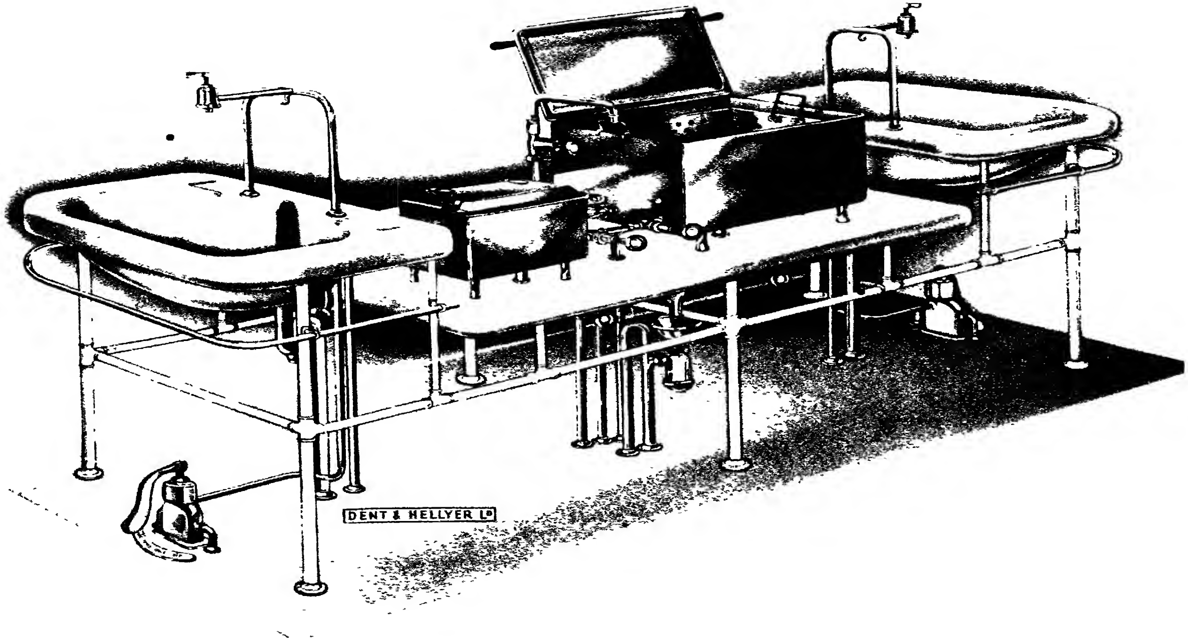
Mouth Gag.—See illustration.

Aural Specula.—A selection of these should be kept in readiness for ear examination.

Laryngeal Mirror and Headlight.—For the examination of the throat when necessary.

Chloroform Mask, Potain's Aspirator, Nelson's Inhaler, or Southey's Tubes may be added as required.

Ward Drugs.—It is necessary to include some of the special applications generally stocked. For eye conditions, various lotions are necessary, these being generally in the form of saturated solution of boracic acid lotion, already referred to. But in more serious cases of eye inflammation, it may be advisable to use silver nitrate preparations, or more commonly, argyrol, generally in 10 per cent. and 15 per cent. strength in watery solution, but stronger if the doctor so decrees. Special ointments for the eye, called *oculents*, are now official in the British Pharmacopœia; the mental nurse may find certain of these in the drug cupboard—oculent of cocaine or oculent of yellow oxide of mercury (1 per cent.); they are drugs specially made up with yellow soft paraffin and wool-fat, and generally supplied in 1-drachm collapsible tubes.



LAVATORY COMBINATION FOR SURGEONS' USE IN THE WARD.
This is of the "Island Pattern," allowing access all round. Note also the provision of sterilizers.
(By courtesy of Messrs. Dent & Hellyer, Ltd., London.)

Apart from eye drugs, there are many for general use on the skin. The old favourites remain, although some have a different name nowadays. The alcoholic solutions of iodine, for instance, now known as *liquor iodi mitis*, and replacing the old 2½ per cent. tincture, and as *liquor iodi fortis* (5 per cent.) replacing the strong tincture, are still popular as applications for open wounds or sprains and closed swellings, as the case may be. Picric acid, in a watery or alcoholic solution of about 1–2 per cent., is frequently used for burns or for other wounds; it is easily recognized

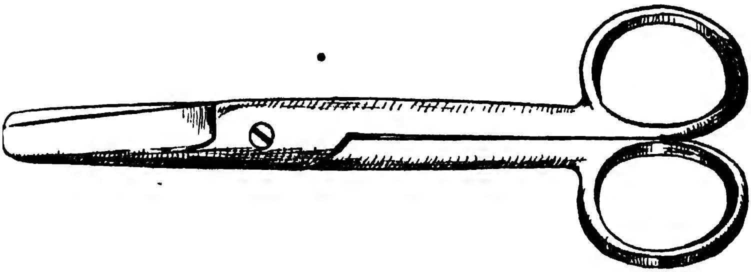


FIG. 118.—DRESSING SCISSORS.

by its bright yellow colour. Various emollient preparations often are necessary in skin conditions, and here we have a great number of ointments. Ointment of zinc oxide, ointment of ammoniated mercury (5 grs. to 1 oz.), ointment of sphagnol, lanoline, and other "cold creams," vaseline (generally combined with boracic acid), and nowadays, for burns, special tannic acid jellies such as tannafax.

The common lotion stocked for eczematous conditions is one of powdered boracic acid and prepared calamine made up with glycerine and lime water; this is applied with gauze and allowed to dry. Various dusting powders consisting of simple boracic

FIG. 119.—DISSECTING FORCEPS.

acid or of iodoform (well known by its pungent odour) are useful in mental wards. As alternatives to the disinfectant lotions mentioned in the previous chapter, there may be stocked modern preparations such as listerine, dettol, monsol, amphyl, sanitas, protargol, etc. Lead and opium lotion is a soothing stand-by for sprains and muscular injuries (*lotio plumbi*).

In every mental ward there should be a good supply of adhesive plaster, especially of the combined gauze-and-plaster type. Collodion and wound varnish are also useful.

Dressing of Wounds

The general routine of carrying out the daily dressings in the ward is that two nurses work together as dressers; one may be termed the " septic nurse," while the other may be known as the

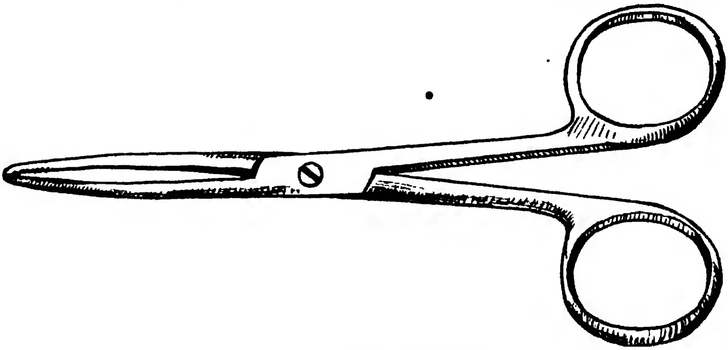


FIG. 120.—SINUS FORCEPS.

" aseptic nurse." The former does most of the preparatory work, turning down the bed-clothes, undoing bandages, and, when the " aseptic " nurse has finished her dressings, making the patient comfortable and removing soiled dressings and dirty instruments.

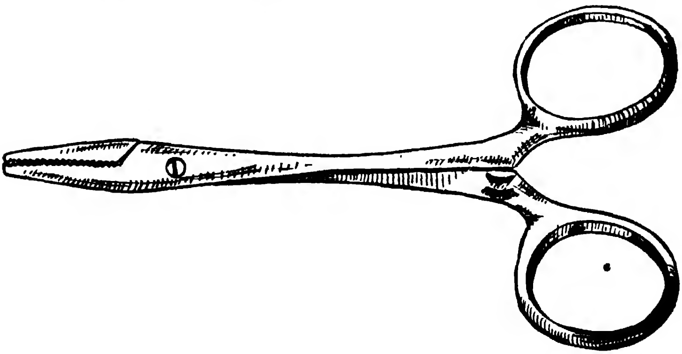


FIG. 121.—SPENCER-WELLS'S FORCEPS.

The latter does the actual dressings, removing with forceps the old gauze and cotton-wool and putting on a fresh dressing.

The principle that as many germs as possible should be excluded from the region of the wound, and not only controlled by antiseptics, is called the *aseptic method* of surgical cleanliness.

In ordinary circumstances, however, although it is unnecessary to apply antiseptics to the patient's skin, it is essential that the nurse should use strong disinfectants in order to cleanse her hands before doing a dressing. All dressings are sterilized by heat, and while the antiseptic method is undoubtedly of value in the methods of wound treatment, *asepsis* should be the ideal of every good nurse. In all her work, therefore, she should endeavour to prevent germs being transported to the patient from herself or from other parts of the ward. As a rule, she should treat first the " clean " healing wounds, and those with stitches uncomplicated by discharges, while any wounds in which pus is present are treated last.

The Nurse's Duties.—While the " septic " nurse must have her hands satisfactorily clean, it is the sacred duty of the " aseptic " nurse to spend at least ten minutes in the preparation of her hands before she touches the patient.

First of all, it must be remembered that the complete sterilization of the skin is almost impossible. Nevertheless, if the following routine is carried out, the risks of transport of septic germs will be reduced to a minimum.

The hands and the arms must be well scrubbed in soap and hot water for about five minutes; several changes of water must

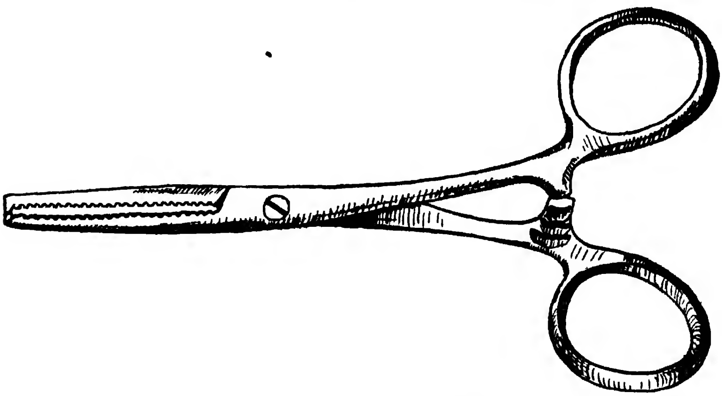


FIG. 122.—KOCHER'S FORCEPS.

be made. The nails should be examined in order to make sure that they are not too long and that they do not harbour any dirt or grease. After a final rinse, hands should be treated for about two minutes with sterile gauze soaked in methylated spirit. Then they should be placed in an enamelled basin containing a 1 in 500 spirit solution of biniodide of mercury. The hands should then be rinsed in another basin containing sterile water, dried with a sterile towel, powdered with a sterile puff, and

covered with sterile rubber gloves. Immediately after this, the nurse should go straight to the patient, clasping in front of her, and well out from the body, her hands, which may or may not be covered with a sterile towel. She then carries out the dressing, the preliminaries of which have been done by the

FIG. 123.—SILVER PROBE.

"septic" nurse. It is essential, of course, that all her instruments are sterilized as described below, and that no one but herself should touch the contents of the wagon, otherwise the chain of asepsis is broken and the patient is in danger of developing septic infection.

In some cases gloves are not used, but they are to be recommended. Rubber gloves can also be put on in the *wet* condition. Previously they have been boiled for about ten minutes, and left in a weak solution of common salt. The hand can then be easily introduced into the glove, which is full of water, and it should be made certain that as little water as possible is left inside.

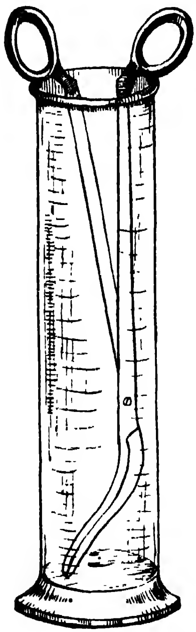


FIG. 124.—DRESSING FORCEPS IN GLASS CYLINDER.

Routine of Wound Dressing.—The wagon should be placed at the end of the patient's bed, or as near to the wound as is convenient for the nurses. Assuming that everything on the wagon has been rendered aseptic, the process of dressing can begin. The wound is surrounded with sterile towels from the drum, then the dirty dressings are quickly deposited in the enamelled bucket, the nurse using dressing forceps which immediately afterwards are placed in the kidney tray provided. The treatment of the wound itself depends upon the instructions of the surgeon, and various methods may be employed, but generally speaking, *liquor iodi mitis* (B.P. 1932) is used, and when dry the wound is covered with several layers of plain sterile gauze and cotton-wool, both of which have been taken out of the drum with sterile forceps. A flannel bandage is then usually applied, and after the first two turns gloves can be removed.

The nurse must bear in mind that her hands may not be the only source of infection to a patient. She must make certain

that she herself is not suffering from boils, septic fingers, sore throat, or other infectious conditions. Certain diseases are very virulent, and the usual custom is that nurses who are in charge of these cases do not dress those wounds which are clean and progressive and likely to be infected and upset if any risks are taken.

Cleaning and Sterilizing Instruments

With few exceptions, instruments can be made sterile by boiling water. For this purpose sterilizers of various types are in use. The tray, which is removable, should be covered by a layer of white lint or several layers of gauze, since the instruments become tarnished when metal is in contact with metal. The sterilizer is half-filled with water to which washing soda is added in the strength of one teaspoonful to the pint, and the solution is allowed to boil for about five minutes. Then the tray can be taken out and placed across the body of the sterilizer while all the instruments, with the exception of scissors, knives, and needles, are placed on it. The tray is replaced, the cover is put on the sterilizer, and the whole is allowed to boil for a quarter of an hour. The instruments are then removed, and placed in antiseptic solution. With regard to knives and scissors, since the cutting edges are quickly blunted by boiling, it is better to wash them carefully, after which they are put in methylated spirit or 1 in 20 carbolic solution. Needles may also require special treatment, and it is usual to stick them through a piece of lint and store them in methylated spirit. It should be noted that aluminium is damaged by soda, therefore when dealing with instruments made with this metal, plain water should be used. Mackintosh material must be scrubbed with 5 per cent. phenol solution. All towels and similar linen articles should be sent to the laundry. Soiled dressings, etc., are deposited in the enamelled bucket, which is covered with a closely fitting lid and stored in the sluice-room

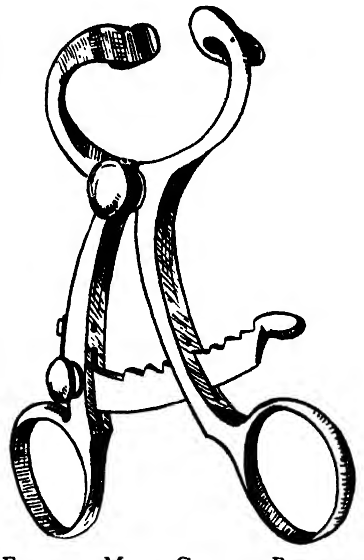


FIG. 125.—MOUTH GAG WITH RATCHET.

until it is taken to the incinerator. Enamelled basins, porringers, kidney basins, and dressing-trays should all be boiled for twenty minutes after careful washing.

Care and Sterilization of Catheters

A catheter is an instrument which is passed through the urethra into the bladder and may be made of metal, gum-elastic,

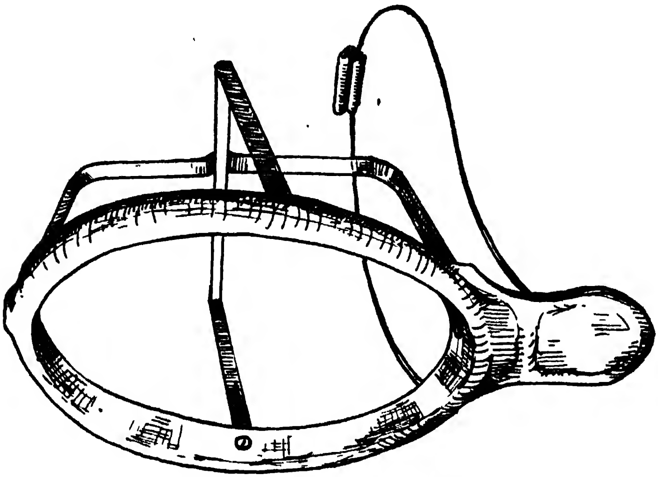


FIG. 126.—ANÆSTHETIC MASK.

glass, or rubber. The commonest catheter in use is made of the last material, and is known as Jacques's catheter; in England sixteen sizes—Nos. 1-16—are in use, but a No. 8 is probably the most commonly employed.

Glass catheters are used for female patients only, care always being taken to see that there are no cracks in the glass. They

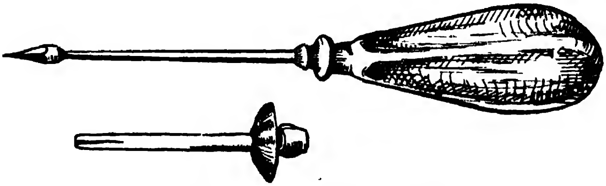


FIG. 127.—TROCAR AND CANNULA.

can be sterilized by boiling for twenty minutes, the catheter being wrapped in several layers of gauze as a protective and put into warm water which is quickly raised to boiling-point. *Metal*

catheters are also made in various sizes, and may be of silver. They are sterilized in the usual way by boiling, and care must be taken that the eye which is situated at the tip does not become choked. Before boiling after use, therefore, they should be carefully scrubbed with soap and water. *Indiarubber* catheters may be used for both sexes, and are suitable when there is no obstruction in the urethra. *Gum-elastic* catheters require treatment in a different way, as they perish when boiled. They can therefore be sterilized in a 1 in 500 solution of biniodide of mercury, by boiling in paraffin, or by placing them in a special jar in which formalin is generated from specially prepared tablets.

Gum-elastic and silver catheters require *stilettes*, which must always be replaced after the catheter has been used in order to ensure that there is no obstruction in its channel.

Bougies.—These are usually made of silver or of stout gum-elastic, and are used to dilate strictures of the urethra. They are sterilized in exactly the same way as catheters.

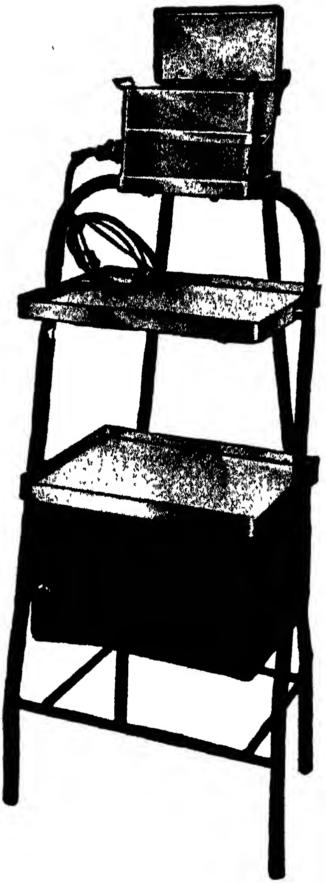


FIG. 128.—COMBINED ELECTRICAL STERILIZER, STAND, LOCKER, AND INSTRUMENT TABLE, USEFUL FOR OUT-PATIENT DEPARMENTS AND WARDS.

(*By courtesy of Messrs. Willen Bros., London.*)

The Preparation of Dressings

Dressings may be done on the aseptic or on the antiseptic principle; since the materials are usually supplied in bulk to the wards, a certain amount of preparation must be made in either case, e.g. cutting lint, gauze, and wool to required sizes, packing drums, and generally making preparatory arrangements so that the actual dressing may be done as speedily as possible and with the least discomfort to the patient.

Aseptic Dressings.—In this type of dressing no antiseptics are used. Plain gauze, lint, cotton-wool, etc., are placed in a sterilizer, and all microbes are destroyed by steam at high pressure,

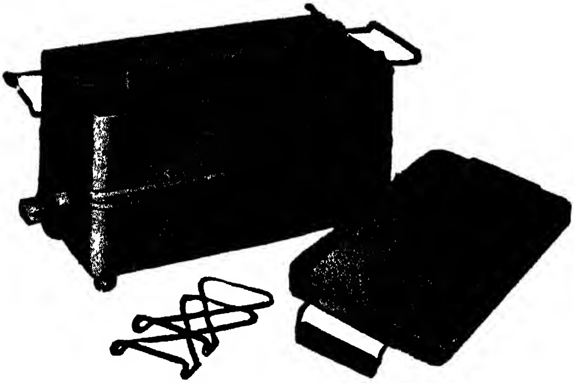


FIG. 129.—SIMPLEX ELECTRIC STERILIZER FOR INSTRUMENTS, WITH LIFT-OFF LID, THREE-HEAT SWITCH CONTROL, AND LIFTERS FOR TRAYS.

(By courtesy of Messrs. Willen Bros., London.)

as described in Chapter 17. When the drum is removed from the sterilizer, it may be assumed that there is not the slightest possibility of any forms of infection in its contents, therefore the

FIG. 130.—THE MORSON-WIGG CATHETER CLEANSER.

A modern apparatus which fits to a tap, as shown, and which thoroughly sluices both the inside and outside of a catheter. The catheter is inserted through the revolving door shown just below the tap. When the catheter is in position and this has been closed, a very small but powerful jet of water may be passed through.

(By courtesy of Messrs. Dent & Hellyer, Ltd., London.)

greatest care must be taken that aseptic dressings are not contaminated before they are placed over the wound. The methods of maintaining asepsis have already been described, and if the

nurse understands the basic idea of the process, she will make sure that the aseptic dressing completely fulfils its purpose as a sterile absorbent of the exudation coming from the part which is dressed.

The various dressings commonly in use are as follows:

Plain Gauze.—This is cut into squares varying in area; 4 inches by 4 inches is a very useful size.

Cotton Wool is dry and fluffy, and therefore takes up a great deal of moisture, at the same time allowing the wound to be aired. It is best applied in several thin layers over the gauze. In some cases, non-absorbent wool is put on as a last protective layer.

Gamgee Tissue is a composition in the form of a "sandwich," made by putting a layer of cotton-wool between two squares of gauze.

Plain or White Lint is sometimes used as fomentation cloth.

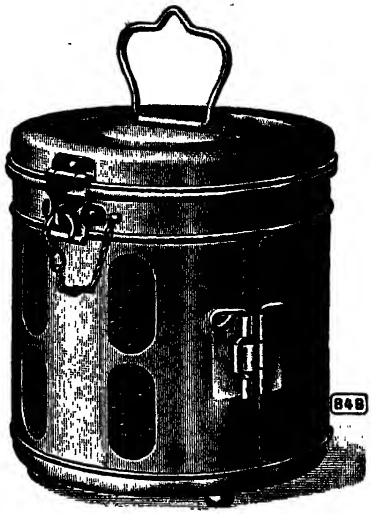


FIG. 131.—STERILIZING DRUM, SCHIMMELBUSH'S PATTERN, WITH ROUNDED CORNERS TO FACILITATE CLEANING.

Copper nickel-plated.

(By courtesy of Messrs. Willen Bros., London.)

There are various other types of dressings, some of which were devised during the Great War. Examples are sphagnum moss and wood-wool. The former has certain natural disinfectant qualities.

Antiseptic Dressings.—*Boracic Lint* is always coloured pink, and is so much saturated with boracic acid that it is always very powdery. It is the approved dressing applied in cases of all septic conditions, and is well known in the moist dressing which is made by a square of boracic lint, applied hot and moist, and then covered over with gutta-percha tissue.

Double Cyanide Gauze is usually tinted fairly purple, and has well-known antiseptic properties due to the presence of mercury and zinc cyanide.

Picric Acid Gauze is made by soaking gauze in picric acid solution and allowing it to dry. It is very useful for burns and in many septic conditions.

Iodoform Gauze is very powerful, but its odour is so strong that many patients cannot stand it, and relatives very often object to

it. It is used in tuberculous cases, especially when there are chronic discharges.

Salicylic Wool is impregnated with salicylic acid, and is slightly pink in colour. It is a very well-known remedy, used in parts of the body where the skin lies in folds and where there is much perspiration.

CHAPTER 14

BANDAGING

TYPES OF BANDAGE. THE TRIANGULAR BANDAGE. THE ROLLER BANDAGE. THE ROLLER BANDAGE: DESCRIPTION AND USES. PARTS OF THE ROLLER BANDAGE. BANDAGING METHODS. SHAPES OF REGIONS TO BE BANDAGED. HOW THE BANDAGE IS APPLIED. RULES OF BANDAGING. BANDAGES FOR VARIOUS AREAS. HEAD AND NECK REGION. THE BREAST. THE SHOULDER. THE ELBOW. WRIST AND PALM. THE CLOSED FIST. THE FINGERS. THE THUMB. THE ABDOMEN. THE PERINEUM. HIP AND GROIN. THIGH AND LEG. KNEE. ANKLE. FOOT. TRIANGULAR BANDAGES FOR THE LOWER LIMB. AMPUTATION STUMPS, ETC. SLINGS. THE LARGE ARM SLING. THE SMALL ARM SLING.

BANDAGES are used for the external wrapping of a dressing, or as a means of fixing splints. There are two types of bandage—the *triangular* and the *roller*. The triangular bandage is of value in first-aid, and is for such purposes oftener made use of instead of the roller bandage. The latter is made and used on the principle that it will remain fixed for several hours.

Splints are rigid supports which take the place of bones incapacitated by fractures, and so maintain the injured parts in a condition of immobility. They may be improvised from various things, as described in the first-aid books, but in hospital and ordinary medical practice, splints are in use of every shape and pattern, many being specially devised for a particular condition. Most of the modern splints are complex in structure, provided with very fine adjusting mechanism, and made of aluminium, steel, leather, etc. The plaster of Paris splint is one made as a mould to an injured limb, as described later on. It is very commonly employed in modern surgery.

Types of Bandage

The Triangular Bandage.—The bandage which has proved of most value in this category is one made of linen or calico, with two equal *sides* measuring about 40 inches, and a *base* measuring

roughly 57 inches. The angle at the *point* (or apex) of the bandage is 90°. The angles at the *ends* are considerably less. The triangular bandage can be used as a covering, as a support for an injured part, or as a sling. It can be folded as follows:

1. *The Broad Bandage.*—This is made by bringing the point to the middle of the base as shown in the illustration, then by folding the bandage again on itself vertically.

2. *The Narrow Bandage.*—This is half the width of the broad bandage; it is made by turning the upper half of the broad bandage on itself.

Triangular bandages are almost invariably fixed by tying the ends in reef knots; all loose ends should be neatly tucked in. Their use as slings is described below.

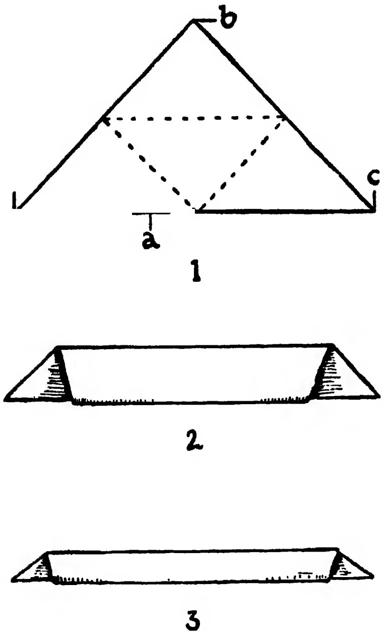


FIG. 132.—HOW TO MAKE A TRIANGULAR BANDAGE INTO (2) A BROAD AND (3) A NARROW BANDAGE.

The first procedure consists in applying the point (*b*) to the middle of the base (*a*).

The Roller Bandage.—Among its many uses, roller bandages have the property of keeping dressings in position, of supporting injured parts, of keeping up pressure on a limb and so limiting hæmorrhage, while they are the binding material of a splinting system, ensuring that the joints are fixed, that the splints are kept in position, and that deformities are corrected, thus making it certain that healing will proceed on normal anatomical lines, and free from unsightly repair of bone. The fabric of a roller bandage varies according to its use; the following list describes each in brief:

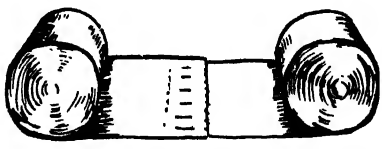


FIG. 133.—THE DOUBLE ROLLER BANDAGE MADE BY FIXING TOGETHER THE ENDS OF TWO SINGLE BANDAGES.

1. *Domette.*—A species of flannel, open-wove so as to allow the

maximum amount of elasticity, makes the most comfortable bandage known. For all serious and extensive cases, *domette* is the material of choice. It has the advantage that it can be adjusted easily at each turn, and so moulded to the part, but it can give its maximum support without being too tight. The result is a contented, comfortable patient, and a lasting demonstration of neat bandaging, which reflects credit on the nurse. Up to a certain point, *domette* can be washed like a blanket, and used several times.

2. *Cotton.*—Bleached cotton bandages, open-wove and sometimes impregnated with phenol or other strong disinfectant, are used for dressings of less serious type, and also in cases in which it may be necessary to destroy the old bandage at each dressing. Sometimes calico, muslin, and other cotton mixtures are used. In the application of the plaster of Paris bandage, a coarse, open-wove muslin bandage, previously impregnated with the plaster, is kept dry in a tin, and wetted before use; it dries as a hard mould or *cast.*

3. *Linen.*—Bandages made of this material are durable and strong, but they have very little elasticity. They are the most economical for long-standing cases.

4. *Crêpe velpeau* bandages are like domette with elastic strands, and are often used in early varicose veins and other conditions in which much support is required. Elastic webbing is much heavier and stronger.

5. *Rubber.*—Two kinds of rubber bandage are in use, the *plain* variety and the *perforated* variety. They are expensive and perish easily, and while they give support and even act as efficient tourniquets, they are employed much less frequently than they used to be, owing to the adoption of better methods.

The Roller Bandage: Description and Uses

Roller bandages vary in length and width; the commonest size is 6 yards by 3 inches, but all widths, from ½ inch to 6 inches, are in use; occasionally a short bandage, about 4 yards long, is employed. Everything depends upon the area to be dressed; it is better to avoid cutting bandages short, especially domettes.

Parts of the Roller Bandage.—The rolled part of the bandage is called the *head*, while the loose portion is conventionally known as the *tail.* We speak of the head rolling up on the *inside*, or *anterior* aspect, of the bandage; the reverse is the *outside*, or *posterior* aspect. A rule in bandaging is that the outside of the bandage should be laid on the dressing to be covered, while the limb should always be bandaged from within outwards and from below upwards.

Bandaging Methods

Shapes of Regions to be Bandaged.—The topography of the body roughly consists of a series of cones, cylinders, and junctions of cones. Examples of the first are the thigh, leg, forearm, and upper arm; of the second, the upper part of the neck, and the area just above the wrist and ankle; of the third, the elbow and knee joints. Padding is always used to make the region suitable for the fixation of a bandage, but it should never be clumsy or unwieldy. Over-padding will not neutralize the effect of unskilled bandaging.

How the Bandage is Applied.—With the above outlines, the methods of putting on the bandage must be adjusted so that the essential functions are made full use of. Apart from the usual types of circular turns, special bandages may be made as follows:

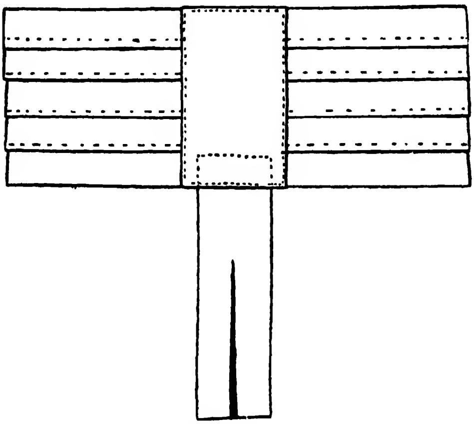


Fig. 134.—The "Many-tailed" Bandage.

1. *The Double Roller Bandage.*—This is made either by sewing together two bandages at their tails, or by rolling up one-third or one-half of the bandage from the tail end and thus producing a two-headed bandage.

2. *The Many-tailed Bandage.*—This is much in use for bandaging the abdomen. To make a many-tailed bandage, cut about half a dozen lengths of domette, 4 inches wide, each length being about 5 feet long. Lay them out on a table, with each one overlapping the other, like shutters or Venetian blinds, for two-thirds of the width. Then take another 5-foot length, preferably in duplicate, and lay it, as shown in the illustration, like the vertical part of a T, down the middle of the other strips. Now stitch the vertical portion carefully to the overlapping strips. The result will be a *many-tailed bandage.* Its uses are referred to later.

3. *The T-bandage.*—This is not unlike the above. There is, however, only one 3-inch or 4-inch strip representing the horizontal part of the T, its length being about 2 yards, i.e. 1 yard on either side of a double strip of similar length, which is sewn to the middle of the horizontal strip and thus forms a T. The two

vertical strands are used to pass round the perineum and to become fixed into the horizontal strand which is tied round the waist.

4. *The Four-tailed Bandage.*—This is especially useful for fractures of the lower jaw. To make the bandage, a strip of domette 3 inches by 36 inches is taken, and it is slit up into two equal tags at either end, leaving a central portion about 4 inches long or slightly more. In this a small diamond is cut out at the centre. The method of application is described below.

Other special types may be devised according to the needs of the case. In the ordinary way, there are six conventional turns employed regularly in using the roller bandage, as follows :

1. *Circular.*—The turns completely cover each other; this is used in fixing the bandage at the start and finish.

2. *Spiral.*—As its name implies, this bandage is wound round the limb in spiral fashion, each turn overlapping its predecessor by two-thirds, and so forming the typical " shuttered " pattern. It is used for cylinders.

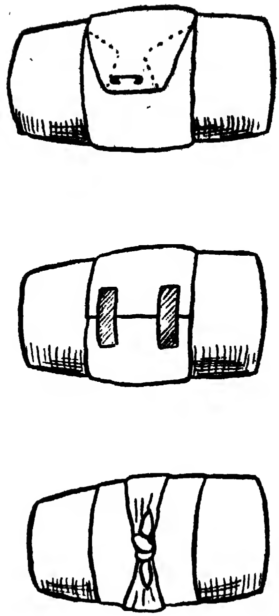


FIG. 135.—THREE WAYS OF FINISHING A BANDAGE.

1. By safety-pin. 2. By adhesive plaster. 3. By knotting.

3. *Reversed Spiral.*—This is very commonly used for covering cones, e.g. the leg, thigh, and forearm. At every turn, the bandage is folded over on itself. To make a reverse, about 3

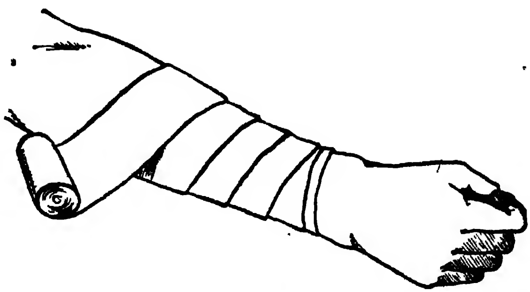


FIG. 136.—SIMPLE SPIRAL BANDAGE, AS APPLIED TO THE ARM.

inches of bandage should be unrolled; place the right thumb at the lower edge of the previous turn, and then, using the left hand, allow the upper edge of the bandage to fall naturally over by twisting round the head of the bandage. Gently but firmly pull the margin into position. A tight diagonal line should mark the fold. Continue similarly up the limb until the pattern shown in the illustration is produced. By this method it is ensured that no space is left uncovered.

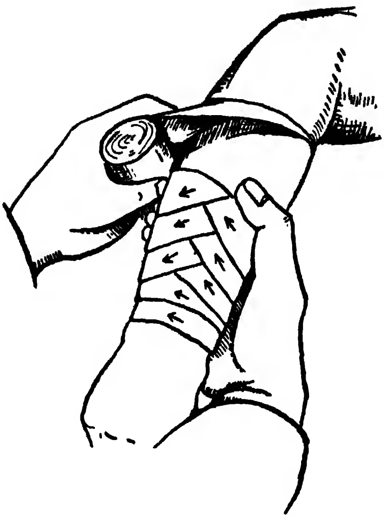


FIG. 137.—THE REVERSED SPIRAL BANDAGE.

4. *Figure-of-eight.*—This is used for joints, one circle passing above and the other below the joint; the middle point of the 8 is just over the joint. The two circles are equal. When one circle is greater than the other, the special name of *spica* is given; this is used on the large joints such as the shoulder and elbow, knee and hip.

Various patterns of this bandage may be formed according to whether the spica is *convergent* or *divergent*, *ascending* or *descending*. Examples of each are quoted in the following pages.

5. *Recurrent.*—This bandage is commonly used for stumps or for cylindrical regions with a free end such as a finger. The bandage is passed longitudinally on the cylinder, backwards

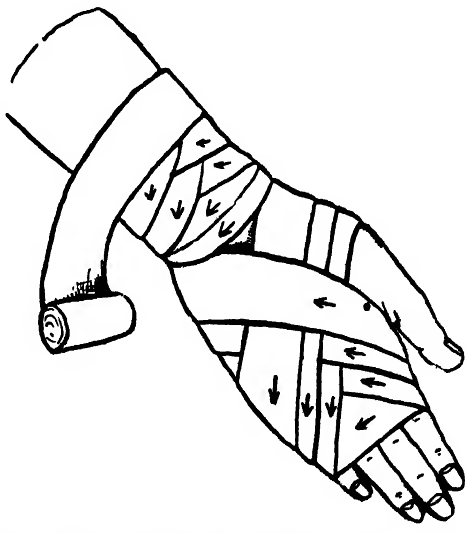


FIG. 138.—FIGURE-OF-EIGHT BANDAGE FOR HAND AND WRIST; REVERSED SPIRAL ON ARM.

and forwards several times, the left hand keeping the loose loops fixed until circular turns fix the whole system in position. The end of the stump shows the turns gradually diverging outwards, except in the case of a finger, where the bandage often is slightly broader than the finger.

6. *Oblique.*—Now and then large areas require preliminary fixation. This is done by passing the bandage in the way it naturally runs; if spaces are left, they are covered later when the cotton-wool is roughly fixed.

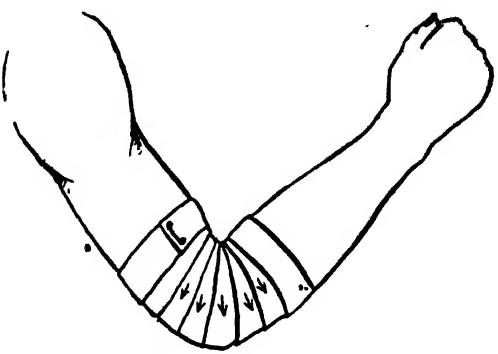


FIG. 139.—DIVERGENT SPICA OF THE ELBOW.

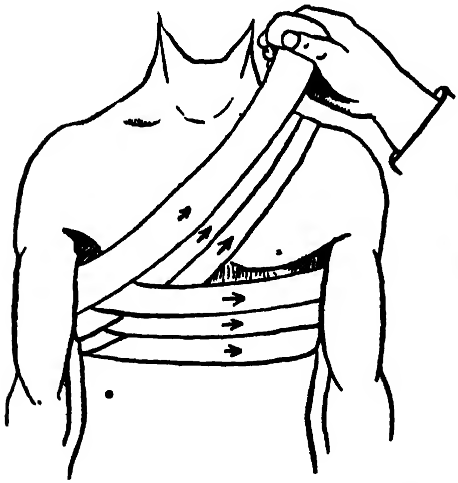


FIG. 140.—ASCENDING SPICA OF THE BREAST.

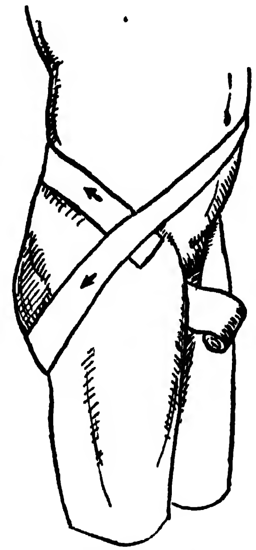


FIG. 141.—DESCENDING SPICA OF THE RIGHT GROIN.

For *cylinders*, the *spiral* bandage is used; for *cones*, the *reverse spiral*; for *joints*, the *figure-of-eight*, or *spica*, bandage. In nearly every case, combinations of these must be used, and there are no

hard-and-fast rules, so long as the bandage is neat, comfortable, and efficient. Many surgeons believe in using the largest single bandage known—the *binder*—when they are dealing with abdominal wounds, as it acts like a corset. The tail should be laid just over the right border of the abdomen, then the bandage is carried once round and finishes up at the left edge, where it is fixed with a series of safety-pins; a double fold thus covers the front of the abdomen.

Rules of Bandaging

To begin with, it should be made sure that the bandages are rolled tightly on the special machine provided for the purpose.

The nurse should stand in front of the patient, and should first set the part in the position in which it is to remain fixed after bandaging is completed. There will thus be no possibility of poor support or of loose bandaging. The great test of good bandaging is provided when the patient returns twenty-four hours later with the bandages exactly as they were when they were applied; there should be no complaints about tightness or discomfort.

In starting the bandage, the nurse should place the posterior surface of the tail on the lowest point of the affected area. Two circular turns are made. Then she proceeds to bandage, passing *from below upwards, from within outwards, and over the front of the limb*. There are certain exceptions to these rules; these are emphasized when specific regions are dealt with. Every turn should overlap the one below it by two-thirds. The lower margins should be parallel, and the reverses should be in line, on the outer aspect of the limb. The pressure should be even and never too tight; a skilled nurse soon gets to know how to pull the bandage at one spot and relax it at another. It is assumed that the wound has been covered with a satisfactory dressing, or that unbroken surfaces, folds of skin, etc., have been copiously powdered and protected from touching by cotton-wool.

When the bandage is all used up, the end may be neatly folded into a small hem and fixed by safety-pins, by light stitching, or by adhesive plaster. In the less formal type of bandage, the end is left for about 12 inches, slit with scissors, and tied in a reef knot round the limb.

Bandages for Various Areas

The only way to become proficient in bandaging is to practise. Textbook descriptions cannot compete with the actual carrying out of the various stages. In the following pages, the established methods are described, but many are omitted and it must be

understood that nothing definite can be laid down; each patient is an individual, and his disability requires applied science and not theoretical patterns. The triangular bandage is described where it is most suitable. In all cases of sepsis and in other diseases requiring frequent changes, the triangular bandage is most suitable, as it is quickly removed and quickly replaced.

Head and Neck Region.—1. *Triangular Bandage for the Head.*—The triangular bandage can be used in various ways for the head, but the commonest example of its use is found in the bandage which covers the scalp completely. For this, we take an ordinary

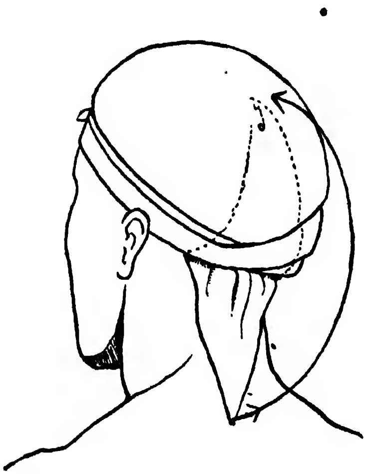


FIG. 142.—TRIANGULAR BANDAGE AS APPLIED TO THE HEAD.

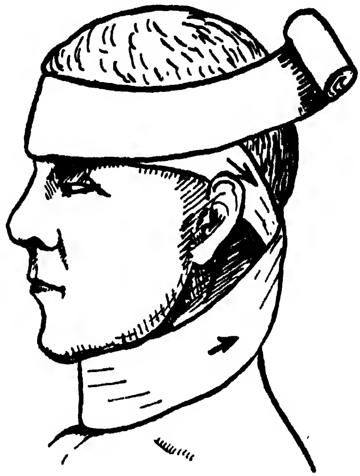


FIG. 143.—FIGURE-OF-EIGHT BANDAGE FOR HEAD AND NECK.

triangular bandage, and the base is folded into a 2-inch hem; the centre of the base is then placed on the centre of the forehead as close to the eyebrows as possible. The point is somewhere in the region of the nape of the neck. The nurse stands behind her patient, and taking the two ends pulls them firmly and ties them in a knot after they have encircled the head once, crossing below the occiput; there should be just enough material to make a neat knot in the centre of the forehead. The long point now lies below the band so formed. It is pulled tightly downwards, then brought forward over the crown, where it is fixed by a safety-pin, as shown in the illustration. The ears should be left uncovered.

2. *The Knotted Bandage.*—This is also called the *spica for the head.* It can be used to cover either the anterior or the posterior half of the head. The nurse should stand behind the patient. With the right hand place the tail of a bandage just above the

left ear; pull down about 8 inches of the tail behind the ear with the left hand, and use the latter to hold the tail in position. Then, with the right hand, roll the bandage round the forehead, carrying it above the right ear, below the occiput, and back to the starting-point. Keeping the tail taut with the left hand, pass the head of the bandage under it, and run the next turn right up across the middle of the scalp, thus making a half-knot at the starting-point. Carry the turn down behind the right ear under the chin, but not too tightly, and back to the starting-point, where another half-knot is made. This divides the scalp into two main areas, anterior and posterior. Either or both can be filled in, but it will be sufficient to describe the anterior space.

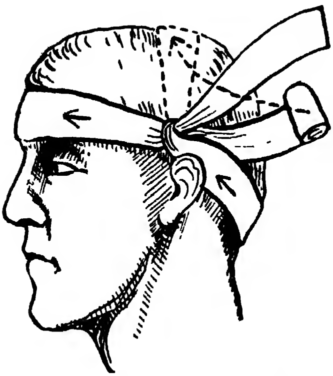


FIG. 144.—KNOTTED BANDAGE (first turns).

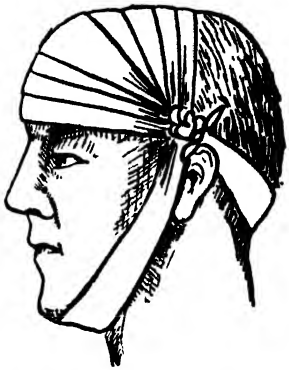


FIG. 145.—KNOTTED BANDAGE (completion).

The first and second turns are repeated alternately, but while the first type forms a series of circular bandages below the occiput, the second type consists of a divergent spica, each turn overlapping the predecessor by two-thirds. Finally, the original surplus tail and the end of the bandage are tied in a reef-knot behind the ear.

3. *The Capeline Bandage.*—Although the bandage to be described is noted chiefly for its historic interest and not for its efficiency, it must be mentioned. Nurses are warned, however, that unless they are very proficient at the application of it, they should leave it alone, as it brings nothing but complaints from the patient and from critics if it is not properly put on. Make a double roller bandage; one roller, used for the horizontal turns, should be bigger than the other by about one-third; the remaining roller may be termed the " vertical " roller. The nurse should stand behind the patient, a roller in each hand, the vertical in the right and the horizontal in the left; the centre of

the bandage should be put over the root of the nose, and the rollers carried round, one on each side to the nape of the neck. The vertical bandage is transferred to the left hand, and the horizontal to the right, a crossing being made. The next stage is the passing of the vertical bandage over the vertex to the root of the nose; while traction is put on the vertical head of the bandage, the horizontal head is carried round the skull, passing above the ear and then round to the front of the head to take in the vertical portion and fix it. By taking turns backwards and forwards over the crown, making them gradually diverge, and

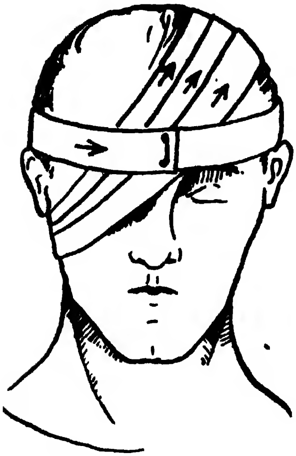


FIG. 146.—METHOD OF BANDAGING ONE EYE.

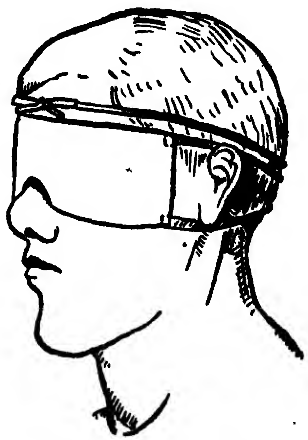


FIG. 147.—MOORFIELDS BANDAGE.

fixing them by horizontal turns at the forehead and occiput each time, the whole scalp can be tightly covered in. Finish with a horizontal turn which is pinned securely.

4. *Bandage for the Eye.*—A single- or double-eye bandage may be required. Two-inch bandages are best. The double-eye bandage consists of alternate turns passing over each eye, and will be easily understood when the single-eye bandage is learned. The procedure is as follows. Suppose the right eye is affected. Place the tail of the bandage on the forehead over the left (sound) eye; pass a turn to the left, round the head above the left ear, below the occiput, and back above the right ear to the starting-point; this fixes the bandage. The next turn follows the same route until the occipital region is reached, after which the bandage passes below the right ear, and sweeps obliquely across the middle of the dressing over the affected eye, across the side of

the crown of the head, and down again below the right ear and so on over the eye. Continue with overlapping edges as usual until the eye is completely covered in. Finish by making a horizontal turn round the forehead. Put a safety-pin in above the root of the nose.

5. *Bandage for the Mastoid Region.*—There are several ways of doing this; one only need be described. To fix the bandage, a horizontal turn should be taken as usual passing round away from the affected ear, round the head above the ears and below the occiput. It fixes the upper part of the dressing on the

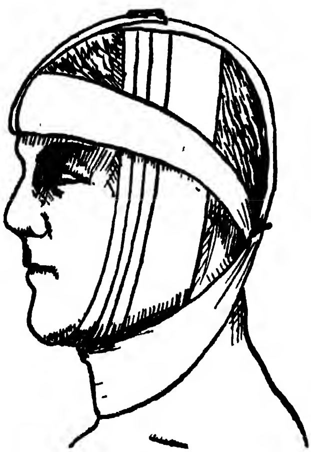


Fig. 148.—Bandage for Ear and Mastoid Region.

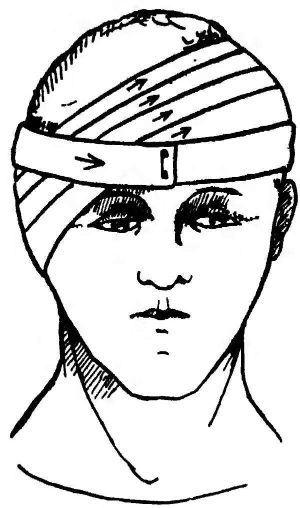


Fig. 149.—Bandage for the Ear.

affected side. Continue the turns, covering the dressing lower down each time, and making reverses before taking the turn horizontally round the forehead and sound side. The last turn should be horizontal and should be fixed by a safety-pin above the sound ear.

6. *Bandage for the Lower Jaw.*—Apply for a fractured jaw the special four-tailed bandage described above. The point of the chin should protrude through the diamond-shaped space. The upper tags are then tied behind, *above* the occipital process; the two lower ones are tied over the crown of the head, passing in front of the ears. All four ends should be tied together.

7. *The Figure-of-eight.*—This is a very useful bandage for the head and neck, and is employed in mastoid disease, in various gland conditions, etc.; it can be varied to suit the different

circumstances. Generally speaking, three main turns are applied, viz. horizontally round the head, horizontally round the neck, and vertically over the head. It is thus easy to fill up the space to be covered, indeed a form of Balaclava helmet may be made. It is very useful for children. The first turn is begun behind the left ear, then the head of the bandage is rolled forward round the forehead, passing above the right ear, round below the occiput, and so to starting-point. The next turn passes as above, except that it runs down the left side of the neck, round the chin, up the right cheek in front of the ear, over the crown of the head, down the left cheek, under the chin and round to the nape of the neck. This can be repeated until the whole area is covered in. Fix the bandage at the back of the neck. Note that at no point is a complete circular turn made round the neck. In some cases, a simple figure-of-eight bandage can be made round the neck and forehead. If the bandage is applied low down on the neck it may be securely fixed by making a few turns round the axilla.

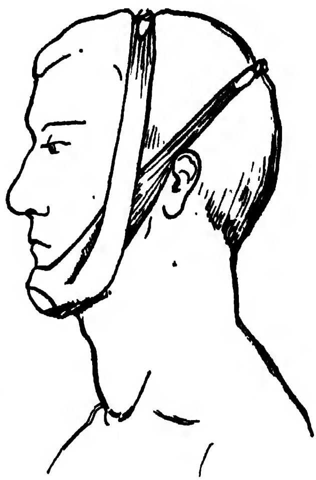


FIG. 150. — THE FOUR-TAILED BANDAGE APPLIED TO A CASE OF FRACTURE OF THE MANDIBLE.

The Breast.—The best type of bandage for this region is the *ascending spica.* The tail of the bandage is placed just below the affected breast, and two turns are made passing towards the opposite side. At the end of the second turn, the third turn is passed over the lowest part of the dressing and allowed to run over the opposite shoulder. It then runs obliquely across the back of the chest to the starting-point, then round the waist again at one-third of the width higher level, and similarly in the oblique direction across the breast. Ultimately, the whole breast should be covered in as shown in the illustration. When both breasts are affected, it is better to use two separate single bandages, so that each breast is supported in an upward direction.

The Shoulder.—A 2½-inch bandage is to be preferred. The *ascending spica* is again used. The axillæ should be padded with cotton-wool after being well powdered. The upper part of the arm should be covered by reverse spirals until the armpit is reached. The next turn passes under the armpit, over the front of the shoulder, down the back obliquely to the lower part of the opposite armpit, then obliquely across the chest to the point of

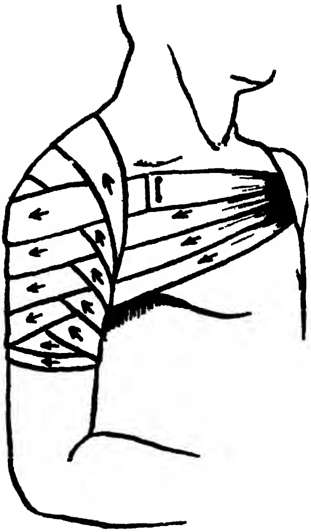


FIG. 151.—SPICA OF THE SHOULDER.

the shoulder, and so under the armpit and over the front of the shoulder again. Continue until the area is covered.

The Elbow.—The divergent spica is used for the elbow. The procedure is typical of that carried out for all hinge joints. The best result is obtained when the fore-arm is at right-angles to the upper arm. To begin, pass two ordinary turns round the middle of the joint, running over the olecranon process. Then gradually diverge the figure-of-eight turns so that the over-lapping edges steadily recede from the central point. One spiral turn should be made on the upper arm to finish.

Wrist and Palm.—For this area, a *figure-of-eight* bandage is used. First the bandage should be fixed as usual by taking two turns round the wrist, then the bandage is passed across the back of the hand to the base of the little finger, turned across the palm, round the index finger, across the back of the hand, and again round the wrist. Several turns like this make a complete covering for the wrist and hand, leaving out the thumb and fingers. Finish either by continuing a spiral bandage up the forearm or by a circular turn round the wrist.

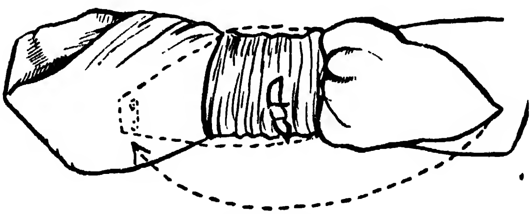


FIG. 152.—TRIANGULAR BANDAGE FOR THE HAND.

A *triangular* bandage can also be used to cover the whole extended hand. The usual hem is made on the base. On this the wrist is placed, palm downwards, and the tips of the fingers towards the point. Cover the hand by folding back the point as far as it will go. Tie the ends after passing them several times round the wrist to include the surplus peak. Make a pull on

the point, and draw it forward again over the back of the hand where it is pinned.

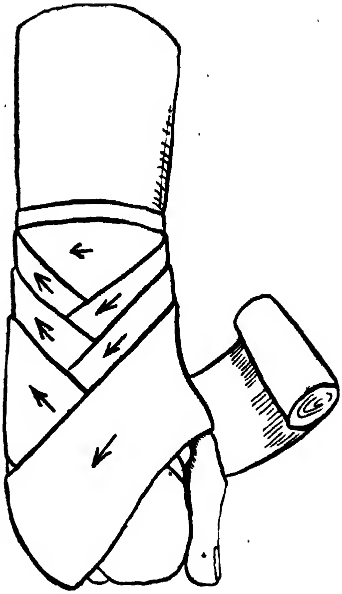


FIG. 153.—BANDAGE FOR THE CLOSED FIST.

The Closed Fist.—In many cases of fracture of the metacarpus, the hand has to be bandaged with the fist closed. For this condition, the *descending spica* is used. The first turn passes *from without inwards* round the wrist. The tail having been fixed, the next turn is taken over the back of the wrist to the web of the thumb; then it passes over the knuckles close to the thumb and back to the wrist, the turns descending on the arm and going inwards away from the thumb by ¾ inch each time until the area is covered. The bandage should be finished by making a circular turn round the hand. It is not an easy bandage to fix properly.

The Fingers.—If two or three fingers are injured or diseased, it is best to treat the injury as a whole and not to bandage each finger separately. In this case proceed as described under the heading of " Wrist and Palm," extending the figure-of-eight to cover the affected area. Plenty of padding should be put between the fingers. In dealing with individual fingers, a spiral bandage should be used, the ends being carried back over the *back* of the hand to be tied round the wrist. In some cases, the recurrent method is used, finishing off with a series of spirals, and tying the ends of the base of the fingers. This usually requires a finger-stall to keep the dressing fixed.

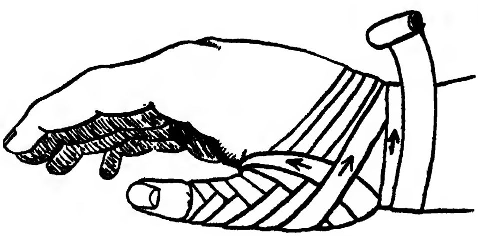


FIG. 154.—SPICA OF THE THUMB.

The Thumb.—A spica is the simplest way of treatment. It begins by the usual turns round the wrist, then passes as a loop through the web of the thumb, as far up the thumb as is required, and back to

the wrist. The spica is worked towards the wrist as shown in the illustration. In all single-finger and in thumb dressings, narrow bandages (1 inch to 1½ inches) are commonly used.

The Abdomen.—The *many-tailed bandage* is frequently used. The bandage is carefully smoothed out and adjusted so that the patient lies evenly on the middle of the vertical portion. The slips are then passed upwards and inwards, from below upwards,

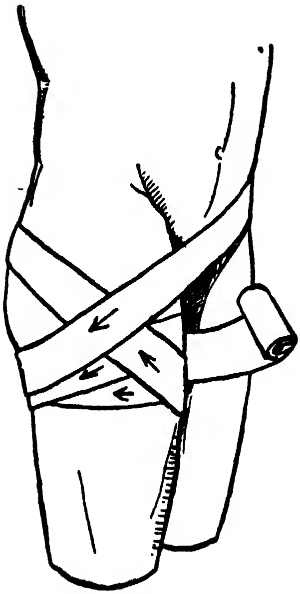


FIG. 155.—STARTING THE ASCENDING SPICA OF THE RIGHT GROIN.

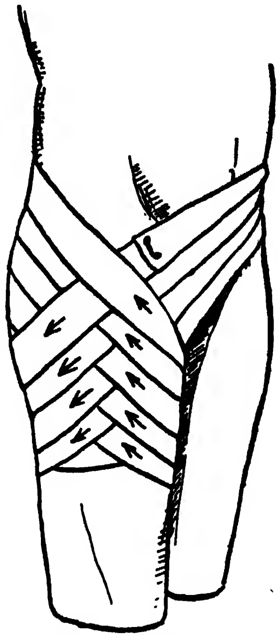


FIG. 156.—ASCENDING SPICA OF THE RIGHT GROIN (completed).

until the whole of the abdomen is covered, the points of crossing being kept neatly in line.

The Perineum.—The T-bandage is used for this area. The horizontal and vertical parts are applied as already described, the latter passing one on each side of the genital organs, and being tied to the horizontal portion. This allows rapid, frequent, and easy changes.

Hip and Groin.—Two classical methods are in use here—the *ascending spica* and the *descending spica.* The main difference is that in the former the successive turns continue to mount higher, while in the latter they descend at each turn. The *ascending*

spica should begin at the middle of the inner aspect of the thigh; it then passes obliquely over the front of the thigh, round the back of the abdomen at the level of the pelvic crests, forward over the front of the abdomen, round the back of the thigh about its middle, and so back to the start. Make the successive turns cover the one below by two-thirds, and thus continue to ascend, and the routine presents no difficulty. Fix the bandage by a few circular turns round the waist. Use a pelvic rest to support the patient. In doing the *descending spica*, the bandage should be placed with the tail on the lateral and upper side of the thigh; it runs inwards round the back of the thigh close to the lower fold of the buttock, appears at the fork of the thigh, and goes obliquely outwards to cross the back over the lower ribs; then it passes downwards and inwards to the outer side of the thigh again. In this way the area is covered from above downwards, the opposite of the process described above.

Thigh and Leg.—Remembering always that these are cones, treat them by reverse spirals or by figure-of-eight bandage.

Knee.—Make a divergent spica over the patella, in a manner similar to the spica of the elbow, already described.

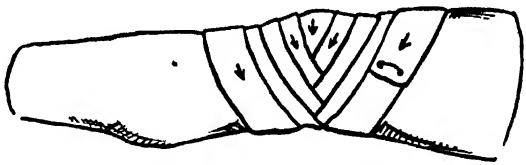


FIG. 157.—SPICA OF THE KNEE.

Ankle.—The heel can be covered in by a divergent spica exactly the same as the bandage for the elbow or knee. As shown in the diagram, a figure-of-eight can also be used.

Foot.—After two fixation-turns round the ankle, a figure-of-eight bandage is made round the instep. To bandage the foot farther forward, apply spirals and reverse spirals as necessary. When the toes are affected, treat the injury as a whole, and bandage as described for the fingers. Very often the whole of the anterior portion of the foot is best covered in by recurrent bandaging. The great toe can be dealt with separately by using convergent spicas.

Triangular Bandages for the Lower Limb.—*At the hip*, two triangular bandages may be used. One is folded into a narrow bandage and tied round the waist, being knotted above the affected hip. The other is applied by drawing the point through the circular bandage at the knot, and making a hem on the base

as far up as necessary, and according to the size of the thigh; the hem should be folded inwards. The ends are then circled round the thigh and tied, while the point is drawn downwards and fixed with a safety-pin.

At the knee, the base of the bandage, turned up as usual into a suitable hem, is passed round the leg below the patella. The point is well up on the thigh. The ends are crossed behind the

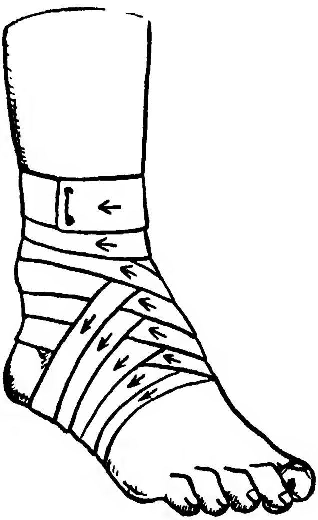


FIG. 158.—FIGURE-OF-EIGHT BANDAGE OF THE ANKLE.

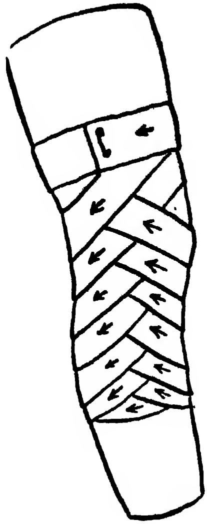


FIG. 159.—FIGURE-OF-EIGHT BANDAGE AS APPLIED TO THE LEG.

knee, and then tied above the patella. The point is pulled downwards and fixed with safety-pins.

The foot can also be dealt with by the triangular bandage. It should occupy an area roughly in the centre of the bandage, the toes towards the point. Pull the point back over the toes to the instep, and bring the ends round from the back of the ankle to be tied over the *point* on the instep. The point may then be pulled forward and fixed with a safety-pin.

Amputation Stumps, etc.—When dealing with these, the best method to use is the recurrent method; if the end of the stump is fairly wide, the turns may be made to overlap. The loops should be fixed securely by circular turns round the base of the stump, and long pieces of adhesive plaster, fixed to the joint above or to the abdomen or chest as the case may be, help to retain the dressing in position.

Slings

The triangular bandage is used for slings. These are necessary to take the strain off any area (chiefly the upper extremity) which is painful, or which requires support during the healing processes of bone, muscle, or other tissues. *Always apply the base of the sling towards the part requiring support.*

The Large Arm Sling.—This is used to take the strain off the forearm and, to a certain extent, the upper arm. The bandage

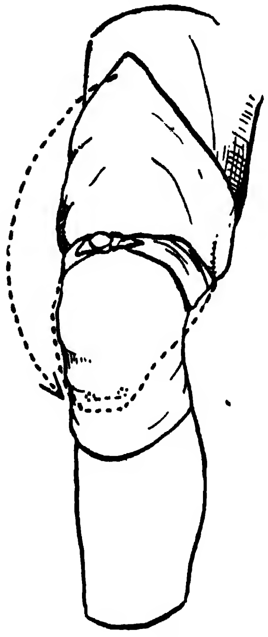


Fig. 160. — Triangular Bandage as Applied to the Knee.

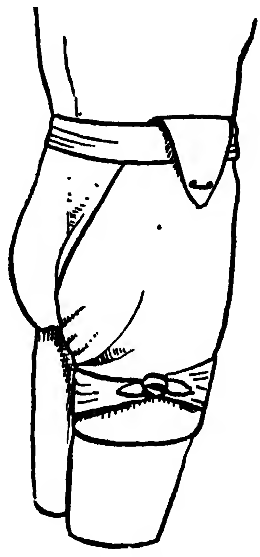


Fig. 161.—Dressing for the Hip, using Two Triangular Bandages.

is spread out on the same side of the chest as the injured limb, the point towards the elbow. One end is pulled round the shoulder of the sound side, behind the neck, and is allowed to hang down for a few inches over the shoulder of the affected side. The arm is carefully laid on the sling, the base passing over the wrist, and the second end drawn up to be tied just in front of the shoulder of the affected side. The point is pulled out, then folded neatly over the point of the elbow and fixed by a safety-pin in front or behind. If more flexion is required, the " reefing " method should be adopted by tucking up the bandage with safety-pins as shown in the illustration.

The Small Arm Sling.—This supports the wrist only. A broad bandage is made from a triangular bandage, as already described. The end is pulled round to the affected shoulder as

Fig. 162.—Application of Sling (part 1).

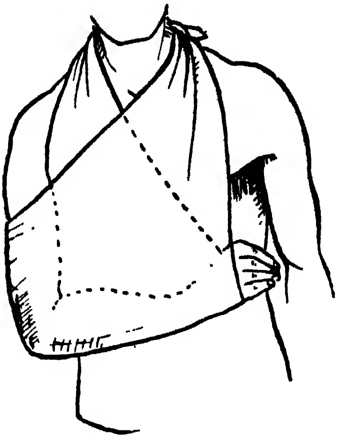


Fig. 163.—Arm Sling (completed).

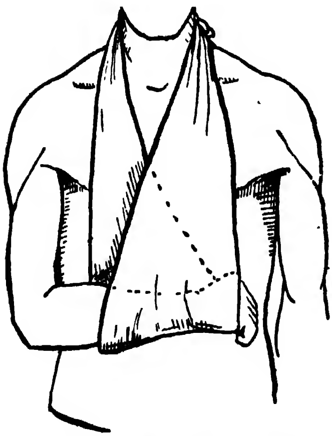


Fig. 164.—Small Arm Sling.

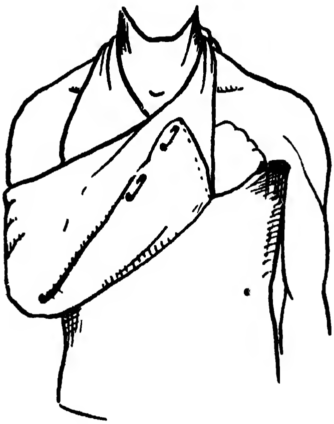


Fig. 165.—" Reefing " of a Sling.

detailed above, and the wrist and half of the hand are laid over the middle of the bandage. The other end is then taken up in front, and tied over the shoulder of the affected side.

CHAPTER 15

SPLINTS IN COMMON USE

SIMPLE SPLINTS. PADDING OF SPLINTS. APPLICATION OF SPLINTS. SPECIAL SPLINTS. LISTON'S LEG AND THIGH SPLINT. CARR'S SPLINT. COCK-UP SPLINTS. CLINE'S LEG SPLINTS. JOINTED ARM SPLINTS. FIXED ANGULAR WOODEN SPLINTS. NEVILLE'S SPLINT. MACINTYRE'S SPLINT. HODGEN'S SPLINT. THOMAS'S SPLINT. BALKAN FRAME. SANDBAGS.

MANY splints to-day are really complicated pieces of machinery and the nurse is not expected to understand the intricacies of such apparatus, unless she is working for a length of time with a particular surgeon. But all nurses must know the commoner varieties of splint, the simple types of which are briefly outlined below, and illustrated in the following pages. It must be stressed that splinting is essentially a practical subject, and furthermore, each patient has individual peculiarities; alterations must be made to suit everybody.

A splint may be defined as an artificial support to take the place of a bone when the latter loses its supporting power owing to injury or disease. Many splints combine manipulative properties with support. Extension and plasters are dealt with in the next chapter.

Simple Splints.—These are also called *fixation splints.* They are made of boards of various lengths and widths, planed flat with rounded ends and bevelled edges. A splint should always be longer and wider than the fractured bone; indeed, in most cases it is as wide as the broadest part of the limb. Metal splints, shaped into " gutters," and made of aluminium, tin, zinc, etc., are much in use because they are light and rigid. Gooch splinting can be cut to various shapes and sizes; it is made by gluing on thin strips of wood to wash-leather or American cloth, the result being a sheet of closely applied spars, similar to the top of a roll-top desk. Felt soaked in resin (poroplastic felt) is also useful; it can be softened, moulded to the part, then dried to hardness and employed as a support. There is no limit to the ingenuity of the surgeon in altering a splint to suit the purposes of the case. The material may be wire-netting,

pasteboard, iron, zinc, leather, etc., in addition to that mentioned above. It may be perforated, adapted with "windows" for dressing the wounds of compound fractures, shaped into angles,

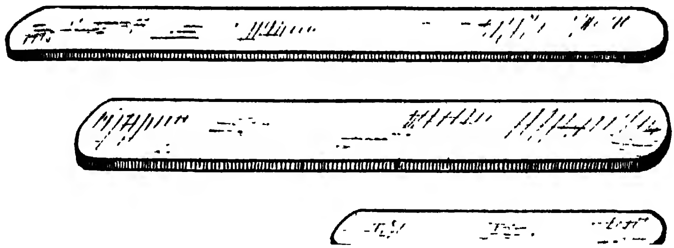


FIG. 166.—PLAIN WOODEN SPLINTS.

hinged, and provided with large holes for protruding points like the ankle, or with special portions for gripping, etc.

Padding of Splints.—Before we apply a splint, we must make sure that the hard material does not press on the tissues and cause

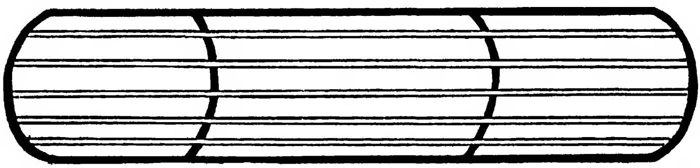


FIG. 167.—WIRE SPLINT.

an ulcer or other serious sore. The limb can be prepared by careful washing, thorough drying, copious powdering with boracic acid and talcum powder, or application of boracic lint. Splint wool, containing oily matter, is best. Care should be

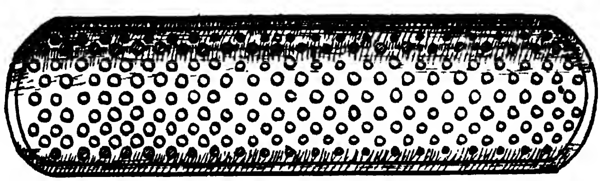


FIG. 168.—PERFORATED ZINC SPLINT.

taken that all the limb is well padded with it, and that bony prominences are cushioned.

The splints themselves may be treated by laying on strips of cotton-wool, and sometimes the splint is actually padded in a

permanent way by making a layer of tow, well teased out, and covered with splint-wool. Over this is passed a covering of linen, muslin, or calico, drawn tightly by cross-stitching with splint-thread passed across the back of the splint.

Application of Splints.—Splints must be applied carefully to the area involved; this is the doctor's province, but the nurse may have to adjust the splint. The usual fixing agent is a piece of webbing with buckle; adhesive plaster, split bands, sheeting, or bandages (triangular or domette) are also employed. The utmost care should be taken that all splints are comfortable; thus the addition of various small pads or cushions, of various shapes, but usually about 2 inches in diameter, and always in readiness as a ward stock, makes all the difference to the welfare of the patient.

Special Splints

Liston's Leg and Thigh Splint.—This is a very simple splint. Made of wood, it stretches from the axilla to beyond the foot. It is less used than formerly, but is sometimes employed as a means

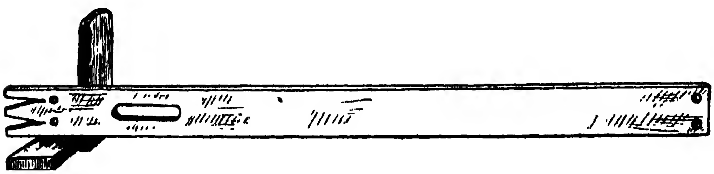


FIG. 169.—LISTON'S SPLINT.

of immobilizing the sound limb when the other is being treated by extension.

Carr's Splint.—This splint is of wood, and has been devised to treat the condition of "Colles's Fracture" of the radius at the

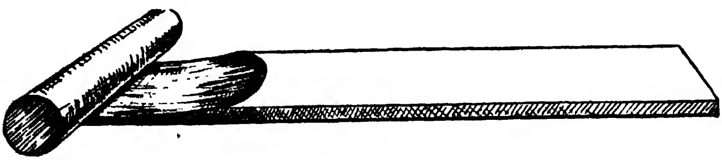


FIG. 170.—CARR'S ANTERIOR SPLINT.

wrist. There are two constituents. The first is the *anterior portion*, on which the forearm is placed. The lower part is planed into a groove to take the wrist, whilst an oblique cross-piece allows the fingers to form a firm grip over it. The second is a short thin *back splint*.

Cock-up Splints.—These are made in various forms, and are used for the wrist and hand. Common types are Jones's and Sinclair's.

Cline's Leg Splints.—Various modifications of these are now in use based on the original pattern, which consists of a pair of

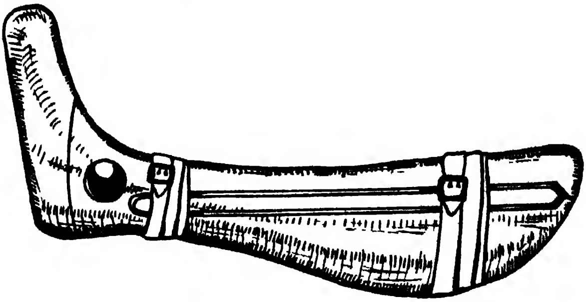


FIG. 171.—CLINE'S LEG SPLINT.

wooden splints, carefully moulded and shaped to the leg and foot, with circular openings over the area of the malleoli, and provided with straps. They may also be obtained in metal.

Jointed Arm Splints are used when there is injury of the elbow, e.g. excision. They are made in wood with iron joints, or all-

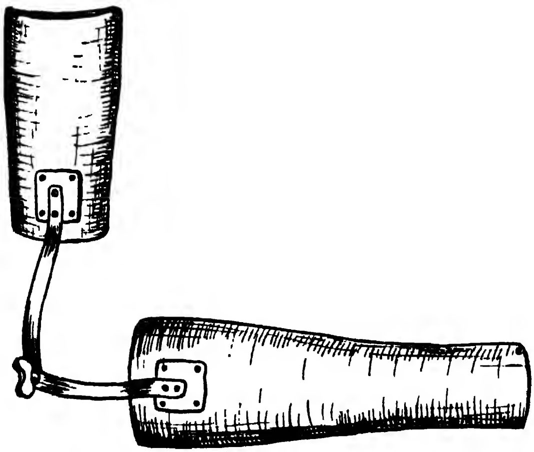


FIG. 172.—JOINTED ANGULAR ARM SPLINT.

metal, and usually have a butterfly screw for adjustment of the two portions.

Fixed Angular Wooden Splints for the arm are plain or shaped, the latter akin to the Cline's leg splint.

Neville's Splint.—This is a stout metal posterior splint and foot-piece, used in fractures of the tibia and fibula. It is representative of a large group devised to immobilize the ankle and keep the whole of the leg below the hip at rest.

MacIntyre's Splint is a more elaborate type of the above. It can be used for the knee as well as the leg. A special type of screw allows the knee-angle to be adjusted, while a butterfly

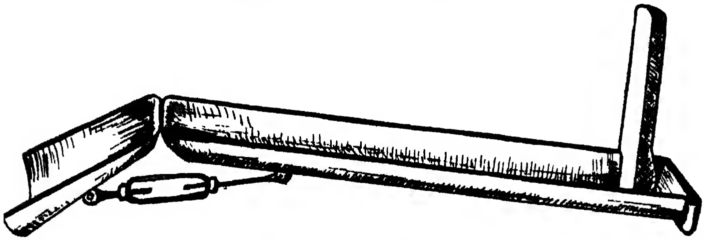


FIG. 173.—BACK LEG SPLINT WITH ADJUSTABLE HINGED THIGH-PIECE, AND FOOT-PIECE WHICH CAN ALSO BE MOVED.

nut permits the movement of the foot-piece through a wide angle. The framework is of iron, pieces fitted on being made of carefully planed and moulded wood. There are numerous modifications.

Hodgen's Splint.—When the femur is fractured near the trochanter, and we wish to keep the knee partially flexed, Hodgen's splint is used. It is a stout iron framework, fitted with

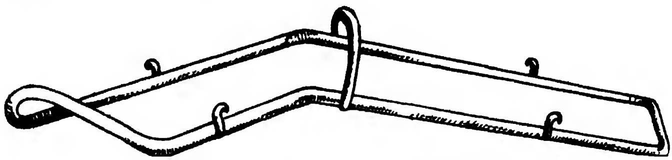


FIG. 174.—HODGEN'S SUSPENSION SPLINT.

hooks and protective arches. The hooks are intended for the fixation of suspensory cords. At the top of the thigh, the wide end of the framework arches over the limb, and the two side-bars terminate in another and narrower and more rectangular arch well beyond the foot. The two side bars support a trough of strong flannel, and the whole limb thus lies suspended in a cradle. Extension is applied also, as described later.

Thomas's Splint.—The name of Thomas is immutably connected with the Great War. The adoption of his splint for various serious wounds with fractures saved thousands of lives. Several varieties are used, differing according to the limb under treatment. Many modifications have been devised.

Thomas's Hip Splint.—The single-bar type, which is not much used nowadays, consists of a long, flat, soft-iron bar, moulded to the body, and extending from the scapula to the calf. It is suspended from the shoulders, and strapped to the chest, waist, thigh, and calf. The patient wears a patten on the sound side, going about on crutches. He is not able to sit. The padding of the body must be carefully done. This was formerly the method of treating hip-joint disease.

Thomas's Knee Splint.—This also requires a patten on the sound side. A padded iron ring fits close to the groin; on either side there run down two strong iron bars, terminating in an oval patten, above which is a transverse bar on which the foot rests.

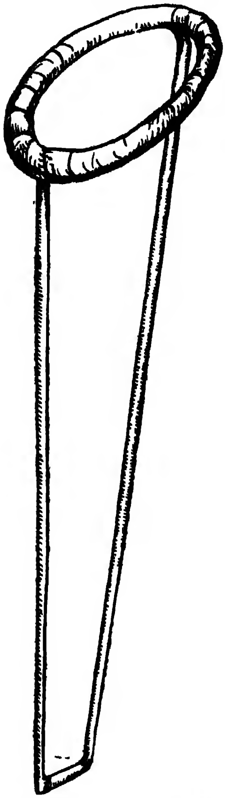


FIG. 175.—THOMAS'S LEG SPLINT.

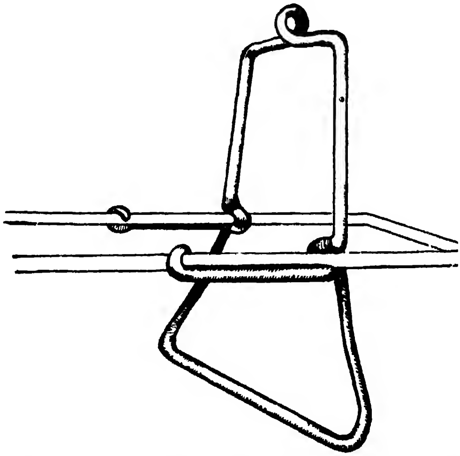


FIG. 176.—FOOT-PIECE SUPPORT FOR USE WITH THOMAS'S SPLINT.

The back of the leg rests on a soft leather sling between the bars. The splint is suspended from the opposite shoulder. Bandages pass round the thigh above the knee, and below the knee round the leg. A patten is provided for the other boot. A modification is the " caliper " splint, which fits into the thickened heel of a special boot; the splint in this case keeps the heel of the foot about an inch from the sole of the boot.

Thomas's Fracture Splint.—This is used for fractures of the upper as well as the lower extremity. The original model was very much like the knee splint, except that the side bars terminated in a very narrow U with a shallow notch for extension apparatus.

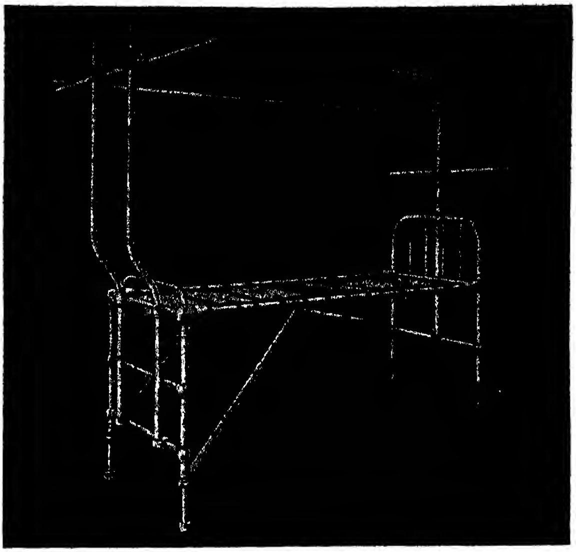


FIG. 177.—FRACTURE BEDSTEAD WITH BALKAN FRAME IN POSITION, ESPECIALLY USEFUL IN CASES OF FRACTURE OF THE FEMUR.

(Lawson-Tait-Pearson pattern.) Seven transverse canvas slings replace the usual spring mattress.

(By courtesy of Messrs. Willen Bros., London.)

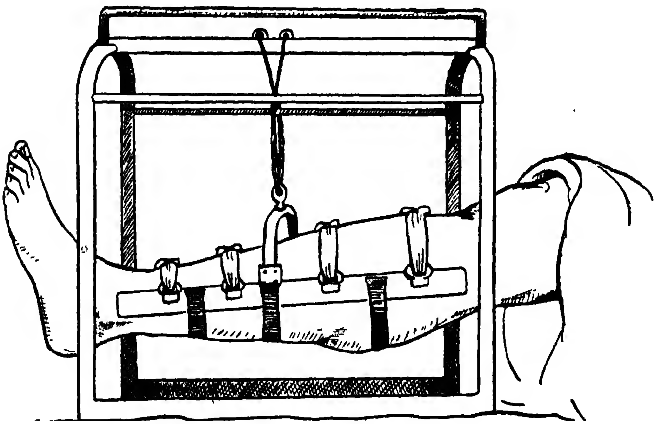


FIG. 178.—SALTER'S CRADLE.

It will suffice at this point to say that this splint has revolutionized the treatment of serious fractures of the femur and humerus, especially when the added effect of the modifications of men like Sinclair and Jones is considered. Jones's humerus extension splint is simply a modification of the straight Thomas's splint, the bars being bent and shaped to form two cradles at right-angles to each other. Many other varieties of splint have been devised to allow the arm and forearm to be carried about comfortably in any position.

Balkan Frame.—This and various other types, chiefly invented by Sinclair, form a framework at the sides and above the bed, so that suspension and extension may be carried out. Especially is this important in the case of Thomas's splint and Hodgen's splint work. Pulleys, cords, and other adjustments are provided.

Salter's Cradle is like the above, but used when there is no need to fix the injured limb to the bed. The cradle runs on pulleys along a central bar. It is often used in cases of excitability and delirium.

Sandbags are useful splints, reinforcing the wooden splints, and preventing the limb from being moved. By fixing one on each side of the neck the head is kept rigid.

CHAPTER 16

EXTENSION AND PLASTERS

MATERIALS REQUIRED. THE WEIGHT AND PULLEY METHOD. PLASTERS. PLASTER OF PARIS. SPECIAL FORMS OF PLASTER SPLINT.

EXTENSION is carried out in practically all fractures before they are " set " (not a very good expression) and splinted. In some cases, however, it is necessary to maintain a steady pull on the limb, owing to the fact that muscular contraction tends to keep up the shortening and to prevent the end-to-end union of the fragments. Again, extension may be necessary in disease of the bones; when the spine, the hip, or the knee are inflamed, it may be advisable to ensure that the surfaces of the adjacent bones are kept from touching each other.

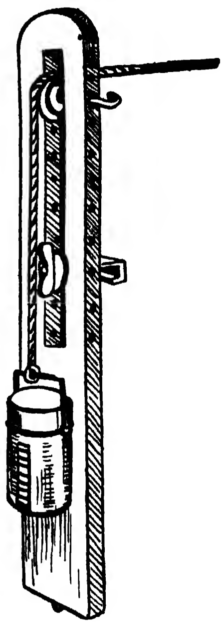


FIG. 179.—GUY'S EXTENSION APPARATUS.

Materials Required.—There are various methods of applying extension, but among other things required in the process are the following: strong adhesive plaster with calico backing, broad tape, needle and thread, scissors, a tape-measure, rolled strips of boric lint reinforced by copious powdering with boracic acid, domette bandages, safety-pins, shaving material, enamel jug filled with boiling water, fracture boards, blocks for raising the bed, weights, stout cord, wire cage, extension frame complete with pulley, and stirrup with webbing and buckles.

The Weight and Pulley Method.—The principle of this method is that a certain carefully adjusted weight is applied to the long axis of the bone, this being fixed to the limb by some simple apparatus which allows a steady traction to be applied to the lower fragment. First of all, therefore, we have to consider the way in which the weight is attached to the limb. As a general

rule, adhesive plaster is used, fixed securely on skin which has been carefully shaved and disinfected. So far as the mental nurse is concerned, this is the only method that need be thoroughly learned.

First of all, the plaster should be cut into two equal pieces, each about one-half of the circumference of the limb in width, tapering according to the character of the limb, and of a length corresponding to the length of the limb. The plaster is heated over boiling water, and applied, one piece on each side of the limb, so that it sticks closely; it is usual to cut notches all round the edges, so that there will be no possibility of the strapping giving way. If boracic bandages have been applied first, they can be fixed carefully and the plaster applied over them. The greatest care should be taken that the upper fixture is properly adhesive. To the lower part is attached on each side the strong tape, over

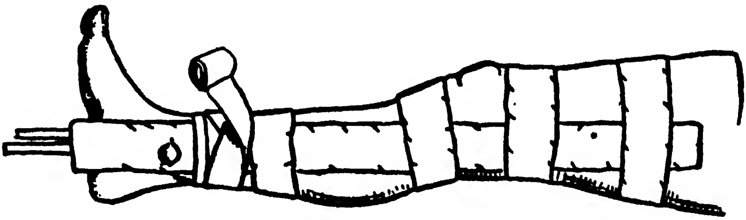


FIG. 180.—A STAGE IN THE FIXING OF EXTENSION PLASTER.

This shows the adhesive bands in position; the external bandage is beginning. as a reversed spiral, well above the malleoli.

12 inches of which have been firmly sewn on. The whole limb is then bandaged securely, but care should be taken that the ankles are left free, otherwise sores may develop; sometimes the ankles are padded, but it is not necessary. Several hours should elapse before the next part of the programme is carried out, viz. the attachment of the weight.

The weight from either side is taken by a *stirrup*, which is an oblong piece of wood, wider than the sole, and bored by a small hole at its centre, through which passes a stout cord, with a knot on the end to prevent it passing through the hole. At each side of the stirrup is a buckle and webbing. This is fixed to the appropriate extension tape. There is now provision made for an even central pull operating through the stirrup on either side of the limb. The cord through the stirrup passes over a pulley fixed to the bottom rail of the bed, and to it are attached weights or carefully measured shot, as preferred by the surgeon. There should just be enough weight to make the fragments touch, and yet to allow the patient every comfort and freedom from pain. Blocks are placed under the legs of the bed at the foot, a cradle

is put over the limb, and the patient is allowed one pillow only, for the head. Various types of pulleys, weights, and stirrups are in use. The necessary counter-extension can be maintained by raising the foot of the bed with 6–8-inch blocks.

Plasters

This term is used rather widely to express the method of enclosing an area in a rigid covering, moulded closely to the affected part of the body. Plaster of Paris is the commonest medium employed, as it quickly hardens into a rigid mass, keeping the part absolutely at rest, but other materials used are starch, water-glass, celluloid, etc.

Plaster of Paris.—The whole principle of making a plaster casing is that plaster of Paris is allowed to set in the meshes of fine crinoline or coarse muslin applied in the form of bandages. These bandages can be bought in tins, all ready for application, but they can also be made by cutting strips of muslin, 3 inches wide and 4–6 yards long, and thoroughly powdering with dry plaster of Paris; the bandage is then rolled up, kept dry, and is ready for use.

Preparation of the Patient.—A nurse has to assist at only one plaster application to realize fully that at the best it is a messy job; therefore the patient and his surroundings must be kept as free of plaster as possible. Newspapers or special sheets are therefore placed under the patient and over the rest of his body, and the floor should also be covered with a large sheet or with newspaper. For the process, several prepared plaster bandages, standing on end in an enamel bowl, are required, also a moderate-sized basin for mixing the plaster, hot water, common salt, old spoons for mixing the plaster, two pieces of cord already well soaked in olive oil, cotton-wool abundantly powdered with boracic acid, and boracic acid in powder form itself.

The first thing to do is to powder and pad the limb well. Let us suppose it is the leg. Plenty of boracic acid should be applied, especially to the webs of the toes; the latter should also be padded lightly with cotton-wool while the heel, ankle prominences, and the line of the base of the toes (the point at which the casing stops) should have special attention when the cotton-wool layer is put over the limb. Domette bandages are then applied to the whole length of the limb, leaving the toes bare. The cord is laid on the inside and on the outside of the limb, forming two vertical tags, which run well beyond the bandaged area, above and below. The plaster can then be applied.

Application.—First, a single plaster bandage is immersed end-on in a bowl, warm water being used; it should be gently squeezed, but only water should be expelled. Needless to say, it is advisable

that both surgeon and nurse should be protected by overalls and cotton gloves; it is very difficult to remove plaster from the nails, etc. The wet plaster-bandage is applied in the usual way, and forms a smooth, rather sticky covering. As each bandage is applied, some *plaster cream* is usually added, being moulded on carefully by the hands. This is prepared by taking about a quart of water in a basin, adding with dry hands the powdered plaster until the particles cease to sink, and then stirring the mass into a thick, smooth cream. It is better to add a teaspoonful of common salt to the cream, as this makes the setting process proceed more quickly. By adding four to five plaster bandages and applying cream each time in this way, the surgeon builds up a stout splint for the limb.

Setting.—The finishing touches are done by making a final coat of cream, which is allowed to become harder for five minutes, then a fine, smooth piece of gauze is rubbed over the external surface. The date of the plaster application can be engraved on the mould, and the four ends of the strings should be moved about to ensure that the cords are free; then they should be turned out over the cast and fixed with a little cream, or adhesive plaster, when the splint is dry.

Drying.—A plaster takes some hours to dry. It may be slung up by an ordinary bandage from a cradle, but Salter's cradle is the best. A powerful electric lamp, or the direct application of hot-water bags without covers, will hasten the drying process, during which the limb must be kept free of all bed-clothes, etc. Small cracks may appear after drying, and it is advisable to varnish the surface, when the splint is perfectly dry, with shellac, size, or with celluloid paint over fine muslin.

Precautions.—The casing must not be too tight, otherwise sores may be formed over the bony prominences. The circulation must be normal; this is judged by the condition of the toes. Allowance may have to be made for swelling after the splint is on; the cotton-wool should therefore be as "springy" as possible.

Removal.—The plaster splint is left on for a variable time, depending upon the wishes of the surgeon. When it has to be removed, several ways are open to us. With the strings in position, as described above, it is a simple matter to use the Gigli wire saw, which is attached to the upper tag on each side and pulled through.

Special Forms of Plaster Splint.—1. *The Bavarian Splint.*—In order to obtain an accurate pattern, it is advisable to take an old stocking belonging to the patient, and to cut off the toe and the heel. The stocking is split vertically in front, and the pattern is provided as a flat outline. Over this place two layers of old flannel, well shrunk, and cut both exactly to the shape of the pattern. Fix the two layers down the middle

by a double row of stitches, thus an appliance like a four-leaf folder is made. The limb is raised and placed over the flannel with the middle of the back of the leg over the seams. The medial folds are drawn forward and fixed in front with safety-pins. Over this is moulded a layer of plaster cream, about

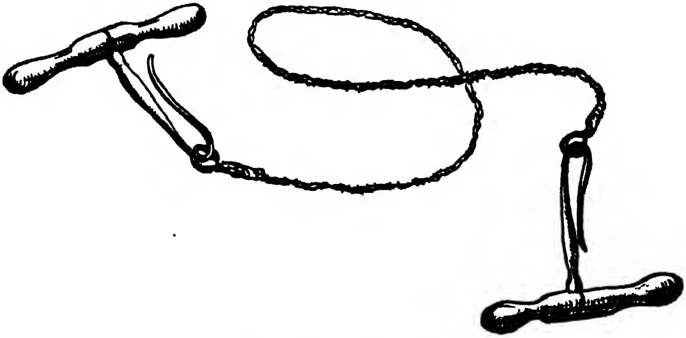


FIG. 181.—GIGLI SAW.

½ inch in depth. Then the outer folds are brought round the limb, pressed into the plaster, and left. The whole may be enveloped in an open-wove bandage. The safety-pins are then removed.

2. *Croft's Splint.*—This has the same pattern as the above, except that the layers are not joined together. There are thus two layers of flannel which exactly fit the inside of the leg, and

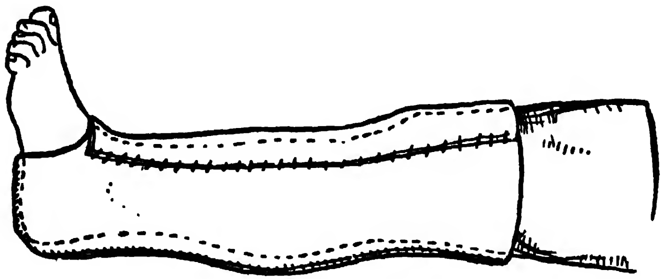


FIG. 182.—BAVARIAN SPLINT, AS APPLIED TO LEG.

two which exactly fit the outside. One of the layers is carefully fitted to the limb; it is covered with a substantial amount of plaster; meanwhile the corresponding layer has been soaking in plaster cream; it is accurately placed over the first. The same procedure applies to the remaining aspect of the limb. Two half-moulds are thus formed, and they are firmly bound by an open-wove bandage. Next day, the front portion of the bandage

may be slit up, and the back part is left as a hinge. Holes can be made on either side of the front edges, through which a lace passes. It is advisable to bind the ragged edges with adhesive plaster. The splint is thus movable, and allows the performance of daily massage and movements.

3. *Spinal Jackets*.—These may be necessary in disease of the spine. The patient is carefully prepared in the usual way, and should be covered with a well-fitting woollen or flannel vest. The body is slung from a tripod, only the tips of the toes touching the bed, then the plaster is applied in the usual way. A cotton-wool pad is placed over the upper abdominal region; this is removed as the plaster sets, and thus leaves the stomach area visible. The jacket should extend from the axillæ to the hips. Drying often occupies twenty-four hours; the patient is laid on a mattress at the side of the fire and "toasted" for a certain period on each side; care must be taken to screen the face. Once the plaster has set, it can be cut open down the front and laced as in the Croft's splint. Poroplastic jackets are sometimes used also, but they require expert fitting.

4. *Other Methods of Plaster Application*.—When starch is used, it is made into a jelly and applied and dealt with very much the same as plaster of Paris. Water-glass can also be used if desired; it dries as *silicate of sodium*, held together by the meshes of the bandage. Drying takes anything from twelve to twenty-four hours. *Pexuloid*, which is a non-inflammable celluloid, is used to form a celluloid splint from a cast, made as described below. Stockinette having been tightly drawn over the cast, a layer of pexuloid is painted on, and a covering of muslin; as each layer dries, it is covered by another; it may take a whole day for one layer to harden. Ultimately, when the splint is of sufficient thickness, it is varnished with cellulose triacetate, and left for nearly a week. It can then be detached from the cast by cutting down the side or the middle in front. The edges are trimmed, bound with leather or muslin and celluloid solution, eyelets are made, and the splint is ready for application over a limb, which should first be covered by a carefully fitted stocking or other garment.

CHAPTER 17

ELEMENTS OF MODERN SURGICAL TREATMENT

PREPARATION FOR RECEPTION OF ACCIDENTS. PREPARATION FOR AN OPERATION. SURGICAL CLEANLINESS. PREPARATION OF PATIENT FOR OPERATION. THE PATIENT. THE PREPARATORY DRESSING. PREPARING FOR THE THEATRE. THE OPERATING THEATRE. EQUIPMENT AND ITS CARE. PREPARATION OF OPERATING THEATRE. INSTRUMENTS, ETC., IN COMMON USE. NOTES ON MODERN STERILIZING EQUIPMENT. DRESSINGS STERILIZERS. POST-OPERATIVE CARE. POST-OPERATIVE SHOCK. RECOVERY FROM THE ANÆSTHETIC. TREATMENT DURING THE FIRST TWELVE HOURS. BLADDER EVACUATION. THE GENERAL CONDITION. AFTER TWELVE HOURS. PREPARATION FOR OPERATION IN A PRIVATE HOUSE. SOME COMMON SURGICAL NURSING PROCEDURES. PREPARATION FOR RECTAL EXAMINATION. PREPARATION FOR VAGINAL EXAMINATION. BLOOD TRANSFUSION. VENESECTION. LUMBAR PUNCTURE. HOW TO MAKE A LUMBAR PUNCTURE. ASPIRATION.

MOST of the surgical experience gained by the mental nurse must take the form more or less of emergency work. The amount of surgery done at a mental hospital during a year is negligible as compared with general hospitals, although all the facilities are generally provided for major surgical operations, and there is usually a small permanent surgical staff. Attempts at suicide, now happily on the decrease and limited more and more by improved nursing and supervision, may, however, be made now and then; there is no gainsaying the fact that even the very best nurses can be outwitted by the patient. Thus, the mental nurse must be aware of the methods of dealing with surgical emergencies, and of the general routine of nursing before and after operations.

Preparation for Reception of Accidents

So far as private work is concerned, the preparation for the reception of an accident, and the associated measures to be taken for getting the victim to bed and settled down as comfortably as

FIG. 183.—A MODERN OPERATING THEATRE, THE MAXIMUM LIGHT BEING SECURED THROUGH END WINDOWS.

(By courtesy of the Cittall Manufacturing Co., Ltd., London.)

possible in the circumstances, depend upon the domestic conditions. The nurse knows what the ideal state should be, and must mould her treatment according to the possibilities of the situation. In the case of severe hæmorrhage, for instance, the essentials are to stop the bleeding and to keep it under control until the surgeon has made the permanent repair; to treat shock; and to disturb the patient as little as possible.

Preparation for an Operation

In a mental nursing book it is not possible to deal with the subject of surgery exhaustively. The chief points in surgical routine may be referred to, however, so that the mental nurse may have a good working knowledge of them.

All operative measures, no matter how small they may be, must be carried out with strict observance of the rules of asepsis. This refers to the patient, to those performing the operation and their assistants, to the nurses in attendance, to the instruments and dressings, and to the subsequent treatment of the affected area. All agree that the institution of absolute asepsis is very

Operating Theatre in a London Hospital.

Advantage has been taken of both wall and roof to produce maximum light.

(*By courtesy of the Cuttall Manufacturing Co., Ltd., London.*)

difficult in a world dominated by micro-organisms, but the more we exclude the germ from our patient the greater is his chance of uneventful and speedy recovery. The routine of asepsis in the ward has already been discussed, but we may now expand our knowledge to the subject as it applies to general surgical technique.

Surgical Cleanliness.—First of all, let us take stock of our present knowledge and of the agents at our disposal. We fully realize that germs are at the root of all septic conditions, that such states not only retard recovery but cause death in many

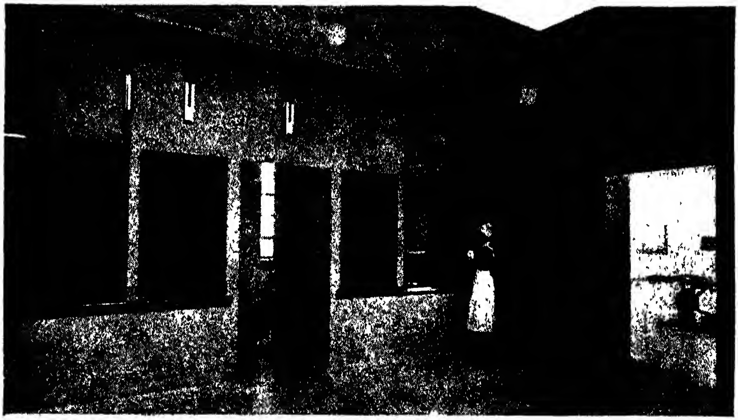


FIG. 184.—A MODERN STERILIZING ROOM, SHOWING BRONZE CHROMIUM-PLATED VERTICAL SLIDING COVERS, CONSISTING OF PLATE GLASS, AND WORKED ON THE WEIGHT-AND-PULLEY SYSTEM.

(By courtesy of the Crittall Manufacturing Co., Ltd., London.)

cases, and that in order to produce the ideal conditions for efficient healing, the work of the germ must be completely unavailing.

The nurse must realize that before Pasteur discovered microbes, and demonstrated conclusively that they were the cause of the terrible prevalence of suppuration in surgical wounds, it was hardly worth while to do any but the most urgent and critical operations. Most of the patients who agreed to risk the operations were martyrs in the cause of science. The handicap to the surgeon was tremendous. The mortality rate was extraordinarily high.

Now, however, the most extensive and most daring explorations may be carried out on the living subject, and with success, by the adoption of the proved method of neutralizing the work of germs.

Preparation of Patient for Operation

In accident and emergency cases, the preparation of the patient may be limited by the urgency of the need for operation, but normally a patient who is to be operated upon for disease is subjected to a form of preparatory treatment which may last for one or two days. In this way the patient himself and the

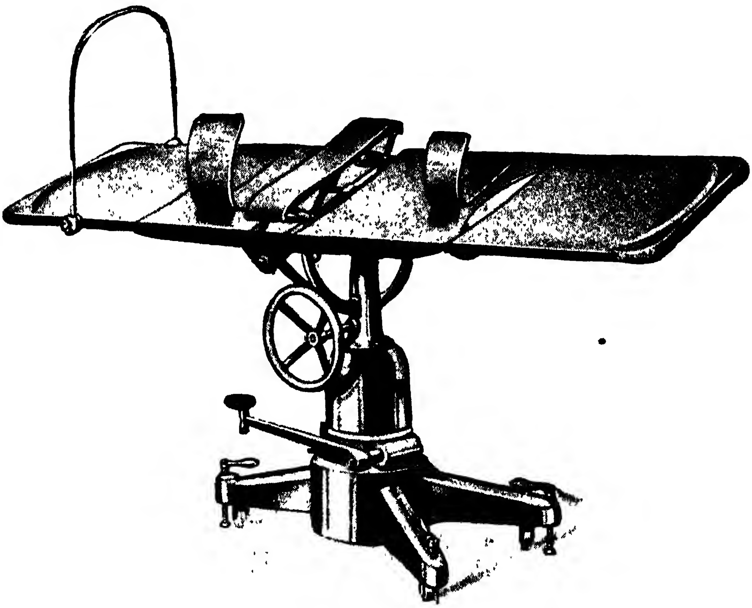


FIG. 185.—MODERN OPERATING TABLE (*a*).

skin in the region of the contemplated wound are made to assume the most satisfactory state for asepsis.

The Patient.—With regard to the patient himself, it is obvious that his physique and resistance should be developed to the full before he is subjected to the shock of the operation and the serious after-effects. It increases his chance of good recovery if he is dealt with *medically* for some time, i.e. by good feeding, by regularization of the bowel and bladder, by dental attention, by mouth disinfection, and by many other methods of removing subsidiary defects.

The local treatment is part of the general routine adopted in most hospitals as a preparation for operation. Assuming that the medical condition is approved of by the surgeon, that there is no abnormality of pulse and temperature, apart from that

UP-TO-DATE OPERATING THEATRE, SHOWING METHODS OF BOTH NATURAL AND ARTIFICIAL LIGHTING.

The window panes are rounded at the corners. There is both roof and wall lighting

(*By courtesy of the Crittall Manufacturing Co., Ltd., London.*)

caused by the disease, that the patient, or his guardians, have given written consent to the operation, and that it is appreciated to the full by all how much may have to be experienced during and after the operation, the preparatory treatment may begin.

It is still customary to give castor-oil (about an ounce) to the patient in the afternoon prior to the operation; this should clear the lower bowel in about four hours. The giving of an enema first thing next morning is ordered in some cases and by some surgeons, but as a routine it is not so common as formerly. Indeed, the attention to the alimentary system is not nearly so

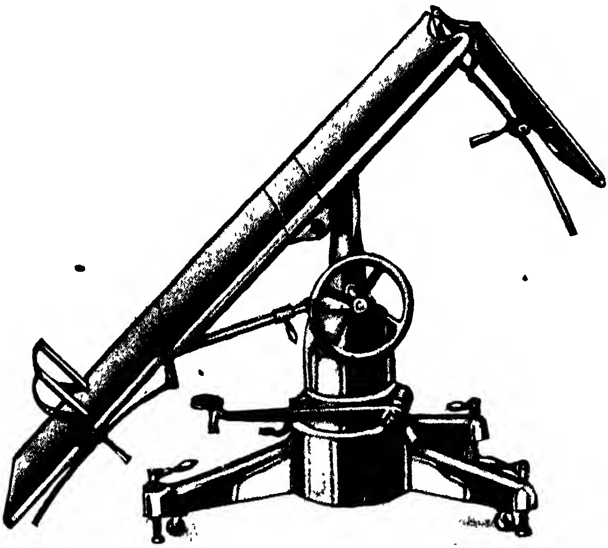


Fig. 186.—Modern Operating Table (*b*).

strict as it was ten years ago. If the operation is to be done in the morning, a light breakfast consisting of tea, toast, and butter, with scrambled egg, may be given, but as a rule, and for obvious reasons, patients do not feel in the mood for hearty meals before operations. The urine should be examined on the morning of the operation, and any abnormality reported. This is of particular importance in the case of children, who develop acidosis very easily when given an anæsthetic. Young or old, however, are safer when given a teaspoonful of glucose in water every four hours during the two days prior to the operation, or alternatively, half a teaspoonful of sodium bicarbonate, well diluted with water, at similar intervals. Barley-sugar is a very convenient way of giving carbohydrate to children; many children are

relieved of all the terrors of the pre-operation period by being given this, which they relish as a sweetmeat. It may be crushed and put on the child's tongue after operation also.

Special cases require special treatment. Thus the bladder may require to be washed out for several days prior to the operation, and the kidneys may have to be cleansed by renal disinfectants. The blood should be cleared of its surplus waste-products by hot baths, diaphoretics, and bland fluids given by the mouth. The stomach or rectum requires special irrigation, particularly in cases of cancer. Many other procedures depend upon the practice of the surgeon, who may be counted upon to give clear and definite instructions according to the conditions of each case.

The Preparatory Dressing.—This is always a very important matter, and it should be carried out with scrupulous care. It should be done immediately after the patient has had his bath. Two nurses should adopt the rôles of aseptic and non-aseptic nurse respectively, and they should conform to all the rules and the routine described in Chapter 13. Not only the actual site of the operation, but the skin for a considerable area round about it, should be dealt with. There are several ways of doing the preparatory dressing, depending upon the type of patient, the nature of the disease, the thickness of the skin, the susceptibility to irritating antiseptics, the ideas of the surgeon, and the custom of the institution. As a rule, however, with ordinary shaving cream the area is vigorously lathered, and shaved closely with a sharp safety-razor. Then the superficial grease is removed by soap and water or spirit. Usually this work is done by the "septic" nurse. From a drum, the "aseptic" nurse takes several sterile towels, and with them surrounds the area treated as above; she thus insulates the operation area from the rest of the body by a sterile barrier. She then rubs the part thoroughly with a swab soaked in ether, and dries with a piece of plain sterile gauze from the drum. As a general rule, liquor iodi mitis (B.P. 1932) is painted over the area, but 2½ per cent. picric acid may be preferred. Not more than two coats should be given. These can be quickly dried by waving a small sterile folded towel over the part. Finally several squares of plain sterile gauze are placed on the area, and they are covered by sterile cotton-wool and an antiseptic bandage of cheap quality, since the latter is usually cut off on the operating table. Accidental wounds, open sores, etc., may be treated somewhat differently, as they require a moist dressing of 1 in 2,000 biniodide, or of boracic acid (saturated solution).

Preparing for the Theatre.—Half an hour before the patient is due to go into the theatre, the nurse should check over the following points and satisfy herself that all are satisfactory.

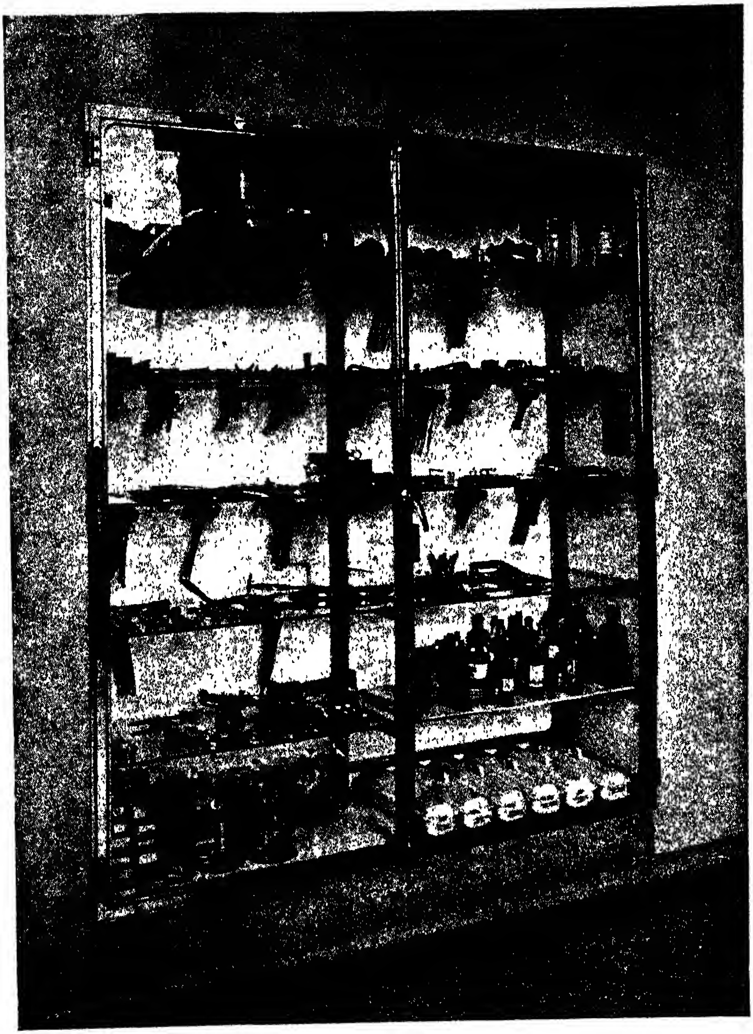


Fig. 187.—Instrument Cabinet with Partitions and Glass Shelves.

Cleanliness is ensured by rounding the corners of the panes (radius corners).

(By courtesy of the Crittall Manufacturing Co., Ltd., London.)

1. The bladder should be empty. 2. False teeth and other adjuncts should be removed. 3. The patient should have on long stockings, or socks and pants, and a thick flannel or woollen jacket with sleeves, this garment tying at the back with tapes; all constrictions should be removed, especially at the neck and wrists.

Immediately after the patient has left the bed, the latter should be prepared by the nurse left in charge and according to approved methods.

The Operating Theatre

Any hospital of note takes a pride in the efficiency of its theatre. It is usually the centre round which revolves the whole of the surgical activities of the hospital; it is the model upon which work of the lesser dressing-rooms and other departments is based. In order to maintain efficiency, therefore, a very strict code is applied to all operating theatres; probably nowhere else will a nurse find that a sense of discipline and of duty is so much required. Once she is fully theatre-trained, the nurse may consider that she has passed one of the most important milestones in her career. A knowledge in considerable detail of the routine is therefore essential, and mental nurses should make themselves acquainted with the facts of operative surgery.

Equipment and its Care.—The main piece of furniture in the operating theatre is the operating table, which nowadays is a highly complex but easily managed machine, capable of many adjustments, and equipped with all sorts of appliances to help both the surgeon and the patients. The table illustrated is one of the most modern, but there is a wide range from which a choice can be made. Worm-screws and levers are provided so that the table may be raised, lowered, or tilted, as required. If necessary it may be covered with an electrically heated blanket or by the older-fashioned method of hot-water bed.

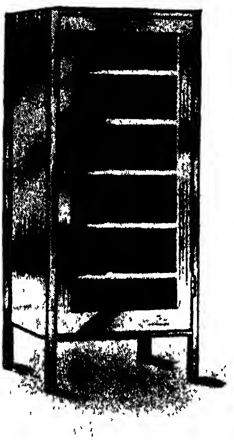


FIG. 188.—INSTRUMENT CABINET IN STEEL, ENAMELLED WHITE.

The legs are securely welded to the cabinet body. The shelves are of glass.

(*By courtesy of Roneo, Ltd., London.*

The rest of the equipment consists of anæsthetist's trolley and chair; various types of

apparatus for giving oxygen, carbonic acid gas, and special anæsthetics; tables for dressings, appliances, basins, instruments. Instrument cabinets may be kept in a side room, or they may be part of the theatre furniture; special washing facilities are provided for the surgeons and assistants. Off the theatre there is usually a sterilizing room, a complete suite for the surgeon, containing bath- and dressing-rooms, an administrative room for the sister, with desk, chair, bureau for records, and other storage places for dressings, clothing, etc.

Everyone in the vicinity of the patient should wear gowns and head-coverings, carefully sterilized. The head especially should be covered by large triangular bandages so that the hair cannot stray into the scene at an inopportune moment. In many cases, masks covering the face with the exception of the eyes are used, but in all circumstances, gauze pads should be worn over the mouth. Most surgeons make a complete change, getting into approved operating kit, and the assistant nurses may be required to do the same. Of great importance is the insulation of the feet; if special "gum-boots," carefully sterilized by carbolic, are not provided, the feet may be encased in linen "socks," which, roughly shaped, are applied over the boots and trousers and tied below the knee. Rubber gloves are essential, of course.

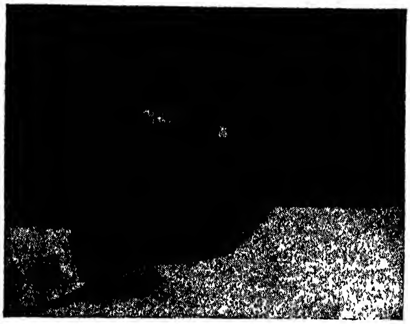


FIG. 189.—SURGEON'S RUBBER GLOVE. Remarkable strength and elasticity after repeated sterilization.

(*By courtesy of Messrs. Willen Bros., London.*)

Preparation of Operating Theatre.—In getting the theatre ready for an operation, the staff has a busy time. After cleansing the theatre and its equipment with disinfectants, the real work begins. The thermometer is consulted, the regulator is set, and the ventilation apparatus is tested. The sterilizers are inspected, and the preparation of hot water is begun. Drums are got ready, supplies of dressings are put in position, a check is made of the basins, bowls, buckets, etc. The oxygen apparatus is looked at. The washing-up system is tested, care being taken to ensure that the levers act easily, that the water is boiling, and that there is ample liquid soap, spirit, etc.

Instruments, etc., in Common Use.—The dressings used in the theatre are in greater bulk and quantity than those in use elsewhere, but they are of the same type. Drums are sterilized

in the autoclave belonging to the theatre; thus the surgeon is assured that the dressings he uses are practically immune to sepsis. Each drum is carefully labelled according to its contents. One nurse is usually detailed specially to cut and prepare the dressings and to pack the drums, the contents of which are determined according to established plan.

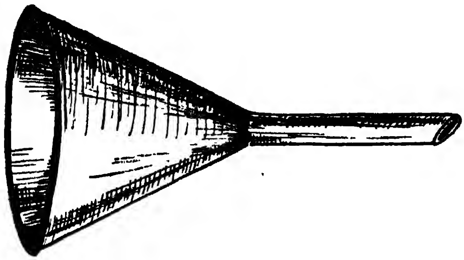


FIG. 190.—FUNNEL OF GLASS OR ENAMEL USED FOR VARIOUS NURSING PROCEDURES.

Ligatures and *sutures* are the "threads" for binding wounds. The former are used for tying a vessel, or for closing the stump left when a piece of tissue (e.g. the appendix) is removed. The latter are employed to unite two surfaces (e.g. the skin edges of a wound). They are used with needles in a way similar to that of ordinary sewing, but many special stitches are devised to make the union firm. Sutures may be made of digestible matter, i.e. they become dissolved by the tissue-fluids after a certain time (examples, *catgut* and *kangaroo tendon*); as a rule, however, stouter material, such as horse-hair, silk, linen, silkworm gut, and even fine silver wire or metal clips are used, these all being unaffected by the tissues, and thus requiring to be removed after a certain time—the classical event of "taking out the stitches."

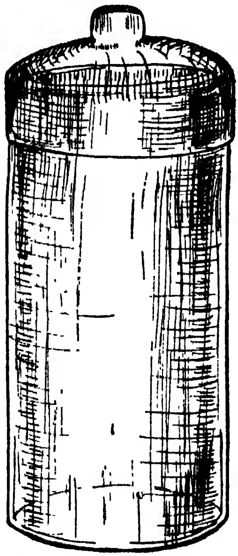


FIG. 191.—GLASS JAR FOR STORING RUBBER TUBING, DRESSINGS, AND OTHER SURGICAL EQUIPMENT.

Catgut.—Much research has been done on this important substance, which is derived from the intestine of the sheep. Experts are still making tests, the difficulty being to obtain a perfectly sterile sample. Catgut cannot be boiled, therefore it must be *prepared* by soaking for a period of eight days, or by other forms of treatment, in an antiseptic such as iodine and spirit, or in chromic acid. Modern manufacturers have reduced the preparation of this substance to a fine art, and now we can obtain very reliable catgut in sealed glass tubes

which are broken only a few minutes before the surgeon requires their contents.

Kangaroo tendon is derived from the tail of the animal, and is also prepared specially, being sold in sealed tubes.

Horse-hair, obtained from the tail, is generally used when we wish to put in the final skin sutures, therefore it is nearly always seen externally. It stands boiling for five minutes, but it is better not to reboil it. It may be stored in 5 per cent. phenol.

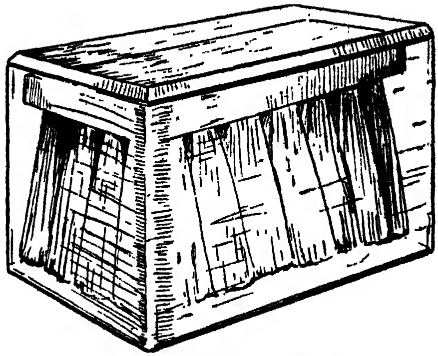


FIG. 192.—BRUSH IN GLASS BOX.

Silk and linen are prepared in much the same way. The former has fourteen grades, and should be prepared, as near to the time of operation as possible, by boiling for half an hour in water *without soda*. It is then stored in a mixture of 5 per cent. glycerine and 1 in 1,000 biniodide of mercury spirit solution. Reboiling tends to make silk fragile.

Silkworm gut.—This is the gut used by anglers. It is the purest silk matter, and may be sterilized in exactly the same way as above. Only three grades are produced—*fine*, *medium*, and *strong*.

Instruments.—It is impossible to enumerate completely the instruments required for an operation. First the type of operation governs the nature of the instruments; a hernia requires a set of instruments entirely different from that required for cataract. Secondly, the individual surgeon must be studied; as a rule, he has certain likes and dislikes, but very often he has become used for several years to his favourite types, and he may bring certain private equipment to the theatre. The instruments we have already studied are all more or less in regular use, and additional examples are added according to necessity. Thus knives vary in size from the huge amputation knife to the finest scalpel used for eye-work. They include blunt-pointed bistouries, knives made so that the blades can be detached and fresh ones fitted at once, hernia knives that are sharp only at a certain place, knives for dividing tendons in the operation of subcutaneous tenotomy, specially bladed knives, with shapes according to the nature of the tissues, and knives which are used for general purposes. Forceps of all kinds must be stocked—dissecting, Spencer-Wells, Kocher's, Halstead's, Moynihan's; scores of other artery forceps are available from

which a selection must be made. There are special instruments such as hernia directors, ligature needles, retractors, clamps, trephines, and sinus forceps. Curved needles, straight needles, scissors of all types (straight, angular, curved, and curved on the flat), probes, and needle-holders must all be included. Indeed, it may be said that the armamentarium of the theatre is limitless.

Other appliances.—A supply of *rubber tubing* of various lengths and sizes should be kept ready as drainage tubes. They are always sterilized by boiling immediately before use. Little eyelets are cut on the sides in order to make the drainage more efficient. Usually the stock is kept in large jars in the theatre, a safe antiseptic solution being 5 per cent. phenol in glycerine and alcohol, equal parts. *Ribbon gauze* should be kept handy, as it is often loosely packed inside the tube as a wick. *Swabs* have almost entirely replaced marine sponges, which are expensive, difficult to sterilize, and a nuisance in the theatre when they become soiled. Various types are required. A small ball of cotton-wool can be securely tied up in a suitable bag of sterile gauze; this is useful for capillary oozing. Or small squares of gauze may be made by loosely fixing a hem all round. Larger sizes and thicknesses are required for abdominal operations; these are known as *pads*; they may be six to eight layers thick and 4–6 inches wide by 6–8 inches long, and are anchored to the wound by a tape (usually coloured) which is held in the blades of a pair of pressure forceps. Larger *packs* may be required for big abdominal operations; these are used to keep the intestines out of the operator's way. The usual *solutions* must be kept ready, including normal saline and sterile water, both of which should be boiled just before the operation, then allowed to cool. As a rule, provision is made for hot sterile water during an operation. The saline solution may be made double strength, and when it is required the cold saline is added to boiling water measure for measure. The various basins, trays, kidney-trays, bowls, etc., are dealt with in exactly the same way as described previously. Towels, protective sheets, and waterproof sheeting (cambric, jaconet, etc.) can be sterilized by steam. The heavier rubber sheeting may be scrubbed with soap, water, and phenol solution.

Notes on Modern Sterilizing Equipment

By J. C. Robinson

It is necessary that nurses should be acquainted with the general features of modern sterilizing installations. Those who were trained in the earlier days would, when confronted by a modern set, naturally imagine that their training had been somewhat

FIG. 193.—DOUBLE SET OF ENCLOSED-TYPE STERILIZERS SERVING TWO OPERATING THEATRES.

(By courtesy of Messrs. James Slater & Co., Ltd., London.)

inadequate for the proper understanding and efficient manipulation of newer and apparently complicated mechanism. There is, however, no occasion to underrate one's capabilities, although the first impression may be somewhat confused. The fundamental principles applying to elementary apparatus remain as a constant factor. It will be observed from the examples we have illustrated that the installations are classified either as the *open type* or as the *enclosed type.* The open type represents apparatus constructed on the first principle, with which we are familiar. There are variants in design, construction, and character, and according to different makers' standards, but in its essential unity, it is the result of an evolution of our old friend, the fish kettle. Apparatus of this open type may be of a very high order in design and craftsmanship, and although certain authorities express a decided preference for the enclosed type, in certain circumstances the use of the open type continues to be the right practice.

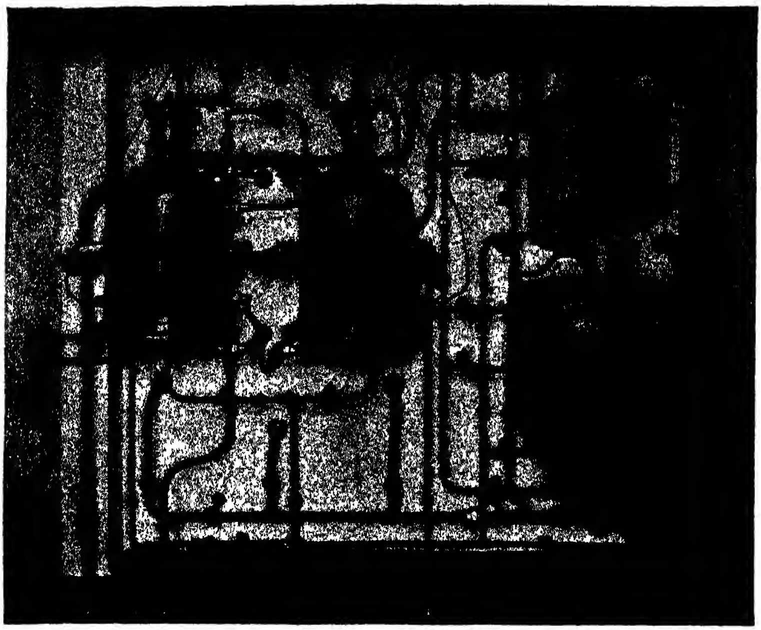


FIG. 194.—INSIDE VIEW OF AN ENCLOSED OR BUILT-IN TYPE OF STERILIZER.
(By courtesy of Messrs. James Slater & Co., Ltd., London.)

The suite shown in Fig. 195 is one of several installed lately in a large English hospital. The hospital authorities gave careful consideration to the practicability of American and Continental models before determining the type of equipment most suited to their needs.

Fig. 194 shows a typical example of a sterilizer constructed on the enclosed, or built-in, principle, which has been applied to some of the later installations in this country. There are usually two steam autoclaves. Instruments and gloves are treated in the smaller, and bowls in the larger. Sterilization is effected by steam at 6 lb. pressure. In conjunction with this set, an open-type instrument sterilizer may be fixed to an adjacent wall. For the sterile water service (hot and cold) the draw-offs, gauges, and controls *only* are projected from the panel. The apparatus and service piping are contained in a chamber immediately behind the panel. The external appearance is attractive, and the absence of pipework creates a very favourable first impression. But we must remember that there is a reverse side, and this external simplicity really involves a greater complexity in the sterilizing chamber than obtains with an open set.

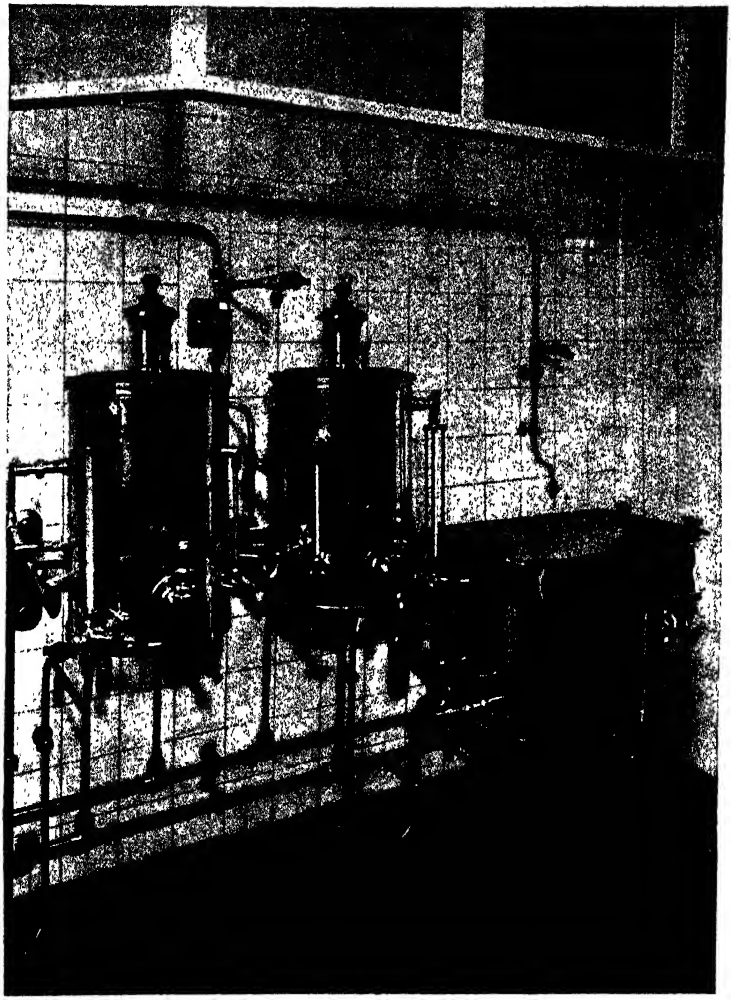


FIG. 195.—OPEN-TYPE SET OF STERILIZERS, FOR HOT AND COLD WATER AND BOWLS.

(*By courtesy of Messrs. James Slater & Co., Ltd., London.*)

The above system can be free from criticism only when the circumstances are favourable, and when design does not interfere with accepted hygienic principles. The view from the chamber side (Fig. 194) illustrates the intricacies of the system, and although it is a well-thought-out arrangement under favourable conditions, it is obvious that the system is not applicable when there is not easy accessibility for cleaning the apparatus compartment.

Dressings Sterilizers.—An example of the rectangular type of dressings sterilizer, which has recently been installed in various hospitals, is shown in Fig. 196. Since the cases which hold the dressings are of rectangular shape, they fit more economically into the space of the sterilizer, and they are thus an improvement on the old circular pattern.

An accepted formula applies generally in the treatment of dressings. Three phases may be defined, viz. (*a*) the 20-inch vacuum; (*b*) 20 lb. of steam for twenty minutes; (*c*) 20-inch vacuum for drying.

This is an empirical rule with a sufficient overproof margin to admit of slight variations in actual practice according to the density of the goods to be treated. Gowns and towels should not be closely compressed, as the residual moisture of dry saturated steam cannot be eliminated in a convenient drying time. The working instructions provided by the makers of these machines should be adhered to. A pressure- and time-recording instrument is usually applied, this giving a chart diagram of the actual processes to which the dressings have been submitted, and which is filed as a true record.

The illustration of the glove sterilizer (Fig. 197) shows an autoclave apparatus for the special treatment of gloves at the low steam pressure of 3 lb. Experiments have shown that for surface sterilizing this pressure is adequate, and as a result of this careful treatment, the life of gloves is materially extended. If gloves are treated with steam at high pressure, their deterioration is very rapid; they survive usually two or three exposures, while with the low-pressure method their life is extended to eight or twelve, which is a considerable economy in the gloves-account.

In the apparatus illustrated steam is the prime heating agent. and it is beyond all question the most effective and economical medium. Where steam is not available, gas and electricity are alternatives. With the former there are risks, and both the L.C.C. and the Metropolitan Fire Brigade suggest that it should not be used in operating theatres and adjoining rooms.

Post-operative Care

When the patient returns from the theatre, he is still under the influence of the anæsthetic. He may be suffering from shock,

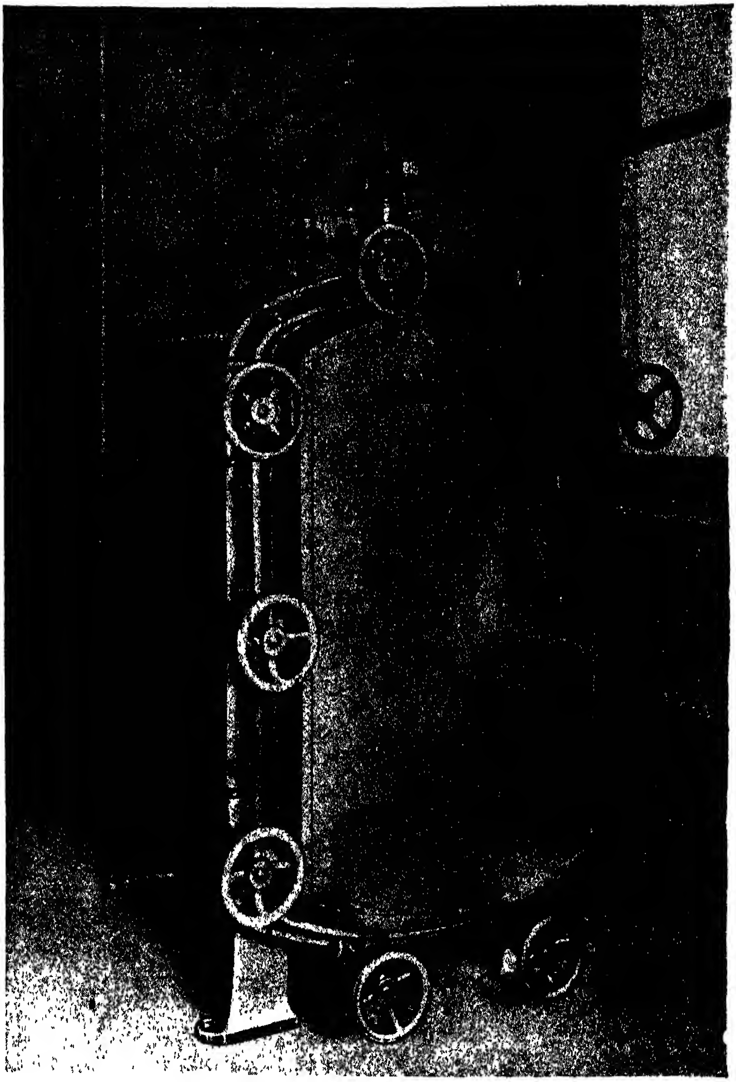


Fig. 196.—Dressings Sterilizer.

Rectangular type.

(By courtesy of Messrs. James Slater & Co., Ltd., London.)

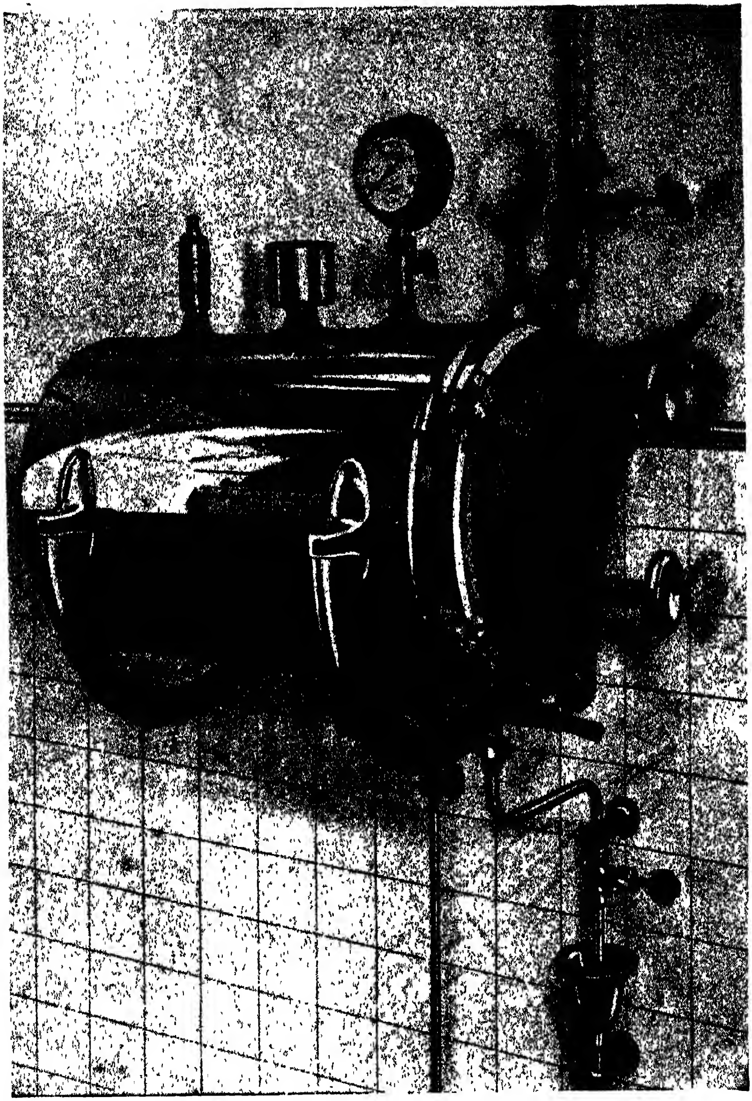


Fig. 197.—Special Type of Sterilizer for Gloves.

(By courtesy of Messrs. James Slater & Co., Ltd., London.

which is very common after severe operations. The nurse in charge should, therefore, understand exactly what is meant by post-operative shock.

Post-operative Shock.—The shock following hæmorrhage, severe injury, etc., has been referred to several times throughout this work. Primarily shock is a depression of the normal activities of the body, but one of the main effects is decrease of the amount of blood supplied at each beat of the heart; the capillaries are thus partially full only, and all the cells must suffer from lack of sustenance. The nurse must keep watch on pulse, respiration, and temperature. The first is faint, sometimes imperceptible, and rapid; the second is increased slightly, very shallow, and often irregular; the third is subnormal. If the patient is conscious, the face appears to be shrunken, and the eyes are deep in the sockets, the condition being accentuated by the intense pallor and cold clammy sweat. Any movement is deliberate and cumbersome. In certain cases, which may be very grave indeed, the mind is clear and collected.

In most cases, shock is prevented by the precautions described above, and in addition the surgeon may give a blood transfusion while the patient is on the operating table. Rectal salines may be ordered as soon as he returns to the ward. As a matter of routine, however, most hospitals are all ready for the occurrence of post-operative shock. The patient is placed in a warm bed, the foot of which may be tilted, and it is usual to fix up a cage with electric bulb inside as a further source of heat. When the patient recovers consciousness he may be given hot drinks at frequent intervals. If hot-water bottles are used, they must be carefully covered with thick flannel or other material, and in many cases they are fixed outside the inner blanket, so that there is no chance of burning or blistering the patient's skin. It is one of the inexcusable faults of a nurse if she allows her patient to suffer in this way; such accidents should never occur.

Recovery from the Anæsthetic.—Depending upon the length and the "depth" of the anæsthetic, the patient takes a variable time to recover, but the nurse in charge should rarely be far away from the bedside. As a general rule, the patient is laid on his back, pillows being dispensed with, and a coarse Turkish towel is spread below his head; the latter is turned to one side, so that in the event of vomiting there may be no risk of choking. A good and attentive nurse will see, however, that at the slightest evidence of commencing sickness she is ready with swabs and sickness-basin to assist her charge. In some cases a bolster or "donkey" is placed under the knees; this is common after abdominal operations.

With regard to anæsthetics used, and the technique of administration, it is considered that so far as mental nurses are concerned,

only the most elementary facts need be appreciated. Doctors themselves now regard the giving of chloroform, ether, nitrous oxide, ethyl chloride, or avertin as belonging in most cases to the specialist side of medicine, therefore the nurse's duties must all the more be looked upon as those of simple assistance.

As a rule, the patient regains a partial semi-dazed type of consciousness, during which he may be sick, and he usually talks more or less coherently, but in a few minutes he may relapse into a fairly deep sleep again, and it is only after he recovers from this condition that he can be said to have recovered from the effects of the anæsthetic. A great deal depends upon the mental and physical make-up of the patient. The science of anæsthetics has made great strides during the last twenty years, and nowadays the risk and the discomforts are at a minimum, so that many of the former difficulties do not now exist; nevertheless, the "dregs" of any anæsthetic remain for about twelve hours after the patient comes out of the theatre if he has undergone a major operation, and his general condition cannot be assessed until the following day.

Treatment during the First Twelve Hours.—Suppose the patient has gradually come round, and has had, without extraordinary incident, the usual sickness and restlessness associated with the post-operative condition. The nurse should first place the patient in the position most suitable to his condition. If there is any question of drainage of the peritoneum, *Fowler's position* should be adopted. Patients who are old, or who suffer from chronic chest troubles, should be given a bed-rest as soon as possible, as there is a risk of *hypostatic pneumonia*. This also applies to those who have had an operation on the stomach or the thorax.

Vomiting, which is much worse after ether than after chloroform, depends upon the contents of the stomach; if the latter contains a small amount of food mixed with blood, mucus, saliva, ether, etc., there is bound to be trouble, but once the stomach is empty, the patient may settle down to his second sleep and have no further trouble. After chloroform, there is always the danger of the condition known as *delayed chloroform poisoning*, which results from ketosis. This is characterized by severe vomiting which goes on and on until the patient becomes delirious, with small, rapid pulse, rise of temperature, great thirst, and scanty urine; the last on examination may be found to contain the tell-tale acetone. In such conditions, barley-sugar, as described above, together with glucose and sodium bicarbonate given by mouth or rectum, is an urgent necessity.

Thirst is one of the first things complained of when the patient recovers, and the custom is to let him have half a pint of warm water if he can take it, as this frequently acts as an emetic and quickly washes out the stomach. This procedure is contra-

indicated in gastro-intestinal states. Sips of cold water may help; the thirst is relieved as soon as the patient is able to retain the fluids. If not, he may be given a rectal enema of warm water to which a small quantity of sodium bicarbonate has been added. Sips of brandy and water often are of sedative as well as thirst-quenching property. In many cases, it is soothing and of relief to the patient to have the mouth washed out with lime-juice or lemon-water. As a rule, however, he gradually develops the ability to keep down increasing quantities.

Bladder Evacuation.—One of the great duties of the nurse is to find out if urine has been passed. In abdominal operations especially, there is always difficulty in passing the first amount of urine, but, if possible, the nurse should try to encourage the patient as much as she can; the application of heat is of assistance to many. But nurses of experience will testify to the fact that the less fuss made over the bladder action the better. Only in extreme cases, and then after permission by the doctor has been granted, should a catheter be passed. A specimen of urine should always be saved, and the amount passed should be carefully measured.

The General Condition.—The patient is restless, capricious, and usually very tired. The bedclothes are frequently out of order and pain begins to be a trouble. The good nurse will anticipate all these events; she must be prepared to give constant attention. Very often aspirin, or sodium salicylate combined with sodium bicarbonate, will soothe the pain and discomfort, and only if the surgeon orders it should morphia be given; the latter is frequently combined with atropine. Pain in the lower part of the abdomen may be due to collections of flatus, and if the patient is unable to pass flatus (a point about which the nurse should always make certain, as she will undoubtedly be questioned by the doctor), he may be given a hypodermic injection of 1 c.c. of pituitary extract, or a *flatus enema*.

After Twelve Hours.—The problems which arise on the second day are (*a*) the food which should be given, (*b*) the evacuation of the bowels, and (*c*) the general nursing of the case.

Food is governed by the nature of the operation and the condition of the patient. In the case of the patient who has had, say, a hernia operated upon, or other simple operation, light diet may be quite well tolerated and may be instituted on the first day. Fluids are generally allowed for those who have had serious operations, but every case is decided on its merits. Too much milk is not good for the patient, as it causes flatulence. The dietetics of the post-operative state are a simple matter of common-sense application of established principles. If the bowel has been operated on, it may be necessary to stop all food

by the mouth for two or three days, and instead nutrient enemas are given, or glucose and normal saline.

The *bowels* should move on the second day, an aperient having been given for their action; in cases of difficulty, an enema may be administered. Small doses of calomel followed by a mixture of magnesium sulphate and magnesium carbonate (*mist. alb.*) are effective as a rule, and there is no doubt that a new era dawns when the patient has had his first motion after the operation.

General nursing depends upon the local dressings, the special food or treatment, and the routine in vogue. One of the main general principles, however, is complete mental and physical rest. The latter can be maintained by the various appliances available; the former naturally depends upon the mental state of the patient. A good nurse will see that her patient is free of all undue physical and mental strain. When the time comes for the patient to be allowed up, he must be very gently dealt with, there being constantly in the mind of the mental nurse that the added complications are making her patient more difficult than usual and the fact that re-education and self-confidence demand great patience.

Preparation for Operation in a Private House

Nursing homes and hospitals are so perfectly equipped and so easily and comfortably reached nowadays that there is very little operating done in private houses. A nurse, however, isolated in a country district, or suddenly faced with an emergency, may have to convert a dining-room or a bedroom into a theatre.

A good light and plenty of space are two things to aim at. The nearer the patient's bedroom the better. The room may actually be the patient's bedroom. As most of these operations are emergency ones, there is no need to raise dust by having a "spring cleaning." After wiping the furniture with a duster soaked in antiseptic lotion, and stowing as much of it as possible in corners, the nurse should spread sheets moistened with phenol solution over it, a similar covering being placed over the carpet. If there is time, however, a rapid clearance of practically everything should be made, especially if two or three days' notice is given. In this case real effort should be made to make the room resemble a proper operating theatre. Linoleum may be left on the floor, but carpets should be taken up, curtains removed, pictures taken out, and only useful furniture such as the table and sideboard left. These may be used to accommodate bowls, drums, etc. A charwoman should be told to scrub the floor and paint thoroughly, and to mop the walls with a disinfectant solution. The floor may or may not be covered with

a disinfected sheet, but it is advisable to lay a large square of mackintosh under the operating table.

In some cases, it is necessary to import a wash-stand and kitchen table to be used as "trolleys," and if the surgeon does not bring his own portable operating table, one may be hired, but many a good job has been done on a plain deal kitchen table, which should not be despised by any means. Kitchen chairs, carefully disinfected, may act as tables for instruments and dressings at the operating table; they should be carefully covered with mackintoshes and sterile towels. Two buckets should be provided.

With regard to vessels and containers, the nurse must raid the kitchen and select the things that will suit best. Copper pans, jelly pans, aluminium saucepans, fish kettles, and various baking basins may all be impressed into service. An enamel pie-dish makes a very good instrument tray, while a large fish kettle is ideal for sterilizing instruments. Most of these containers should be sterilized in the operating room by pouring in a little methylated spirit and setting it alight. The usual lotions and solutions must be ordered by the nurse, and overalls and other costumes are easily obtained, so there is no need to improvise. The hot-water supply in the kitchen may be maintained by a cool-headed relative who should be shown how to fill enamel jugs with boiling water, then how to cover them with sterile squares of linen or towelling until the water is required, either hot or cold. In almost every case, the surgeon brings drums containing an ample supply of dressings, in addition to his own instruments.

Some Common Surgical Nursing Procedures

The mental nurse may have to prepare a patient for examination in the theatre, or for special examination in bed of a region such as the rectum or the vagina. These procedures, as well as certain common minor operations, are dealt with below.

Preparation for Rectal Examination.—When a rectal examination is ordered, the nurse must ensure that the rectum is cleared of fæces. If an ordinary manual examination is to be done, the patient will be examined in bed, but if the proctoscope is to be used (an instrument for examining the inner surface of the rectum), the examination will probably be conducted in the theatre, with the patient under an anæsthetic.

In either case, an enema must be given not more than three hours beforehand. On the trolley is put a kidney-basin containing rubber gloves or rubber finger-stalls. Swabs of gauze and cotton-wool should be also provided, a weak antiseptic for the toilet of the anus, and a small jar of boro-vaseline or tube of lubricating jelly. The bed should be screened.

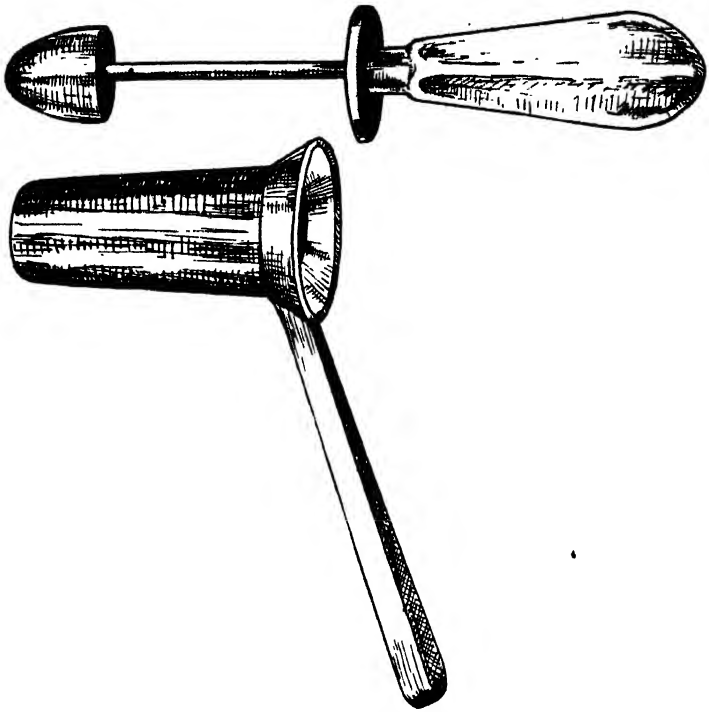


FIG. 198.—PROCTOSCOPE.

To put the patient in the most satisfactory position for the doctor, place him on the left side with the head at the top right-hand corner of the bed and the buttocks as near to the left-hand edge of the bed as possible. The right thigh should be well drawn up. For this examination, the bed-clothes may be rolled up from the bottom of the bed to a point just above the hips. Till the doctor is ready, the legs may be covered with a blanket. A waterproof sheet covered with a towel should be placed below the buttocks. Make sure that the patient has passed urine recently.

Preparation for Vaginal Examination.—The rectum and bladder should be prepared as above. In addition to the equipment mentioned, there should also be provided a *Sims's speculum*, a pair of *Volsellum forceps*, and a *uterine sound.* Clean glass slides should also be handy in case a smear should have to be taken.

The patient may lie in three different positions, according to the requirements of the surgeon or the nature of the case:

(*a*) The left lateral position as described on the previous page;
(*b*) Lying flat on her back, the hips slightly raised if necessary;

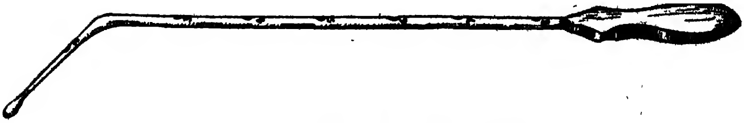


Fig. 199.—Uterine Sound (metal).

(*c*) Sims's position; the patient is placed on the left side, then the left arm is allowed to hang over the edge of the bed, while her face is turned towards the pillow; the right thigh is drawn up.

The doctor may examine with two hands or one, and may

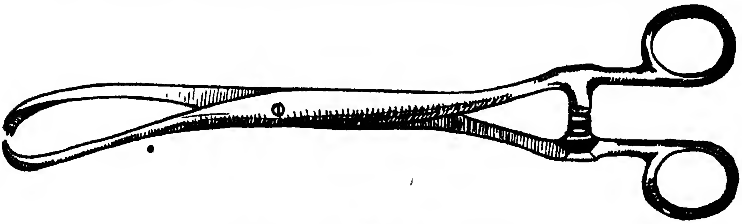


Fig. 200.—Volsellum Forceps.

require the patient to be turned into various positions. The nurse must never leave the patient during the examination.

Blood Transfusion.—Blood can be transfused in two ways. It may be passed directly to the patient from the donor (Kimpton's method), in which a vacuum jar collects the donor's blood and

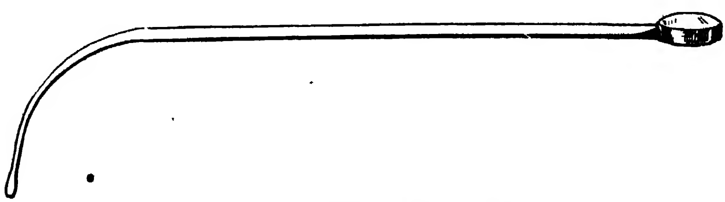


Fig. 201.—Urethral Sound (metal).

the latter is then forced by pressure into the patient's vein. It may be collected by the citrate method, which is the better one. First of all the donor (who is usually on a register and has been tested for freedom from venereal disease, etc., and who is of the same " type " as the recipient) must undergo venesection in the usual way, his blood being collected to the amount of 400–500 c.c.

in a carefully sterilized flask containing an amount of sodium citrate sufficient to prevent clotting of the blood. During the passage of the blood, the mixture must be kept gently in motion by a stirring rod. The blood mixture is kept at body temperature. Meanwhile the patient's vein has been exposed; the donor's blood is transferred by the ordinary infusion method or by using Keyne's flask. Careful precautions must be taken to maintain asepsis.

The benefit of blood transfusion is that, in contrast to saline, dextrose, or gum, it conveys oxygen to the tissues. This is very

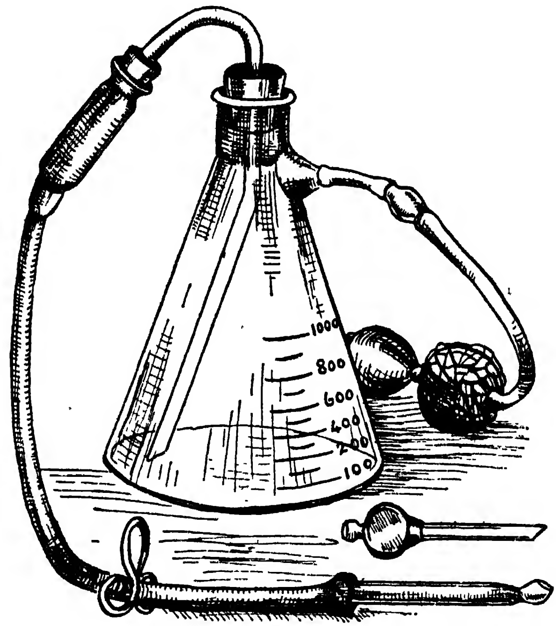


FIG. 202.—KEYNE'S TRANSFUSION APPARATUS.

important when the patient is in a critical condition owing to loss of blood. After transfusion, the patient must be carefully watched, as signs such as cyanosis, dyspnœa, a sensation of tightness over the heart, or collapse may indicate that the transfusion has not been a success.

Venesection.—If the blood-pressure is too high, e.g. in uræmia or in severe heart failure, blood may be drawn off from a vein. The old-fashioned method of using leeches is not yet given up, but it is much slower in action. The procedure is much the same as for intravenous saline infusion, except that the vein may sometimes be punctured and the blood drawn off

by a cannula. Generally, however, the tourniquet is left on to increase the pressure in the vein, and the blood passes into a measured receptacle. One half to one pint may be withdrawn. The tourniquet is then removed, and the skin is sutured and bandaged as described above. There may be transient light-headedness of the patient, but it quickly passes off, and the general reaction is good.

Lumbar Puncture.—We know from anatomy books that the brain and spinal cord are surrounded and bathed by the cerebro-spinal fluid. This fluid may become abnormal when the brain or spinal cord is diseased, or when the membranes surrounding them are inflamed. Cerebro-spinal fluid is drawn off by the process of *lumbar puncture* very commonly in mental and neurological hospitals, and for one or more of the following reasons:

(*a*) When the pressure of the cerebro-spinal fluid is increased owing to the quantity being excessive. This is found in *meningitis*, or inflammation of any portion of the meninges. The brain and spinal cord are literally crushed, and headache, unconsciousness, and a varying degree of paralysis are produced.

(*b*) In order to find out the condition of the fluid, and to ascertain whether certain cells and bacteria are present.

(*c*) In order to inject an anti-toxic serum for certain diseases which affect the brain or spinal cord.

(*d*) For the production of spinal anæsthesia, a method rapidly gaining in popularity.

How to make a Lumbar Puncture.—As with all aspiration and tapping, very strict aseptic methods must be employed. The

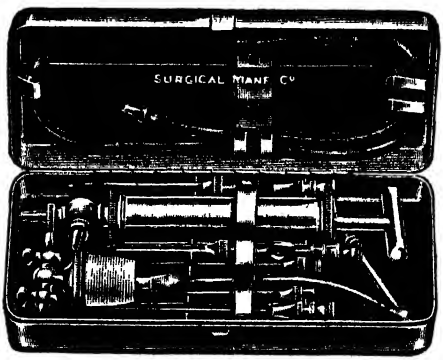


FIG. 203.—POTAIN'S ASPIRATOR.
(By courtesy of the Surgical Manufacturing Co, Ltd., London.)

patient lies on one side in a curled-up position, with the back curved as much as possible; the knees should be drawn up, and

the head bent over the chest to the maximum extent. In some cases, the patient sits upright and bends as far forward as he can. In either case, the area for puncture is freely exposed, viz. the space between the 3rd and 4th lumbar vertebræ. The appliances required are exactly the same as for aspiration, except that the aspirator is replaced by a special lumbar-puncture needle. The local anæsthetic must be allowed a few minutes to have effect, then the needle of the puncture instrument is boldly inserted a little to the side of the interspace, and it should pass right into the spinal canal; little or no danger can occur to the cord at this spot. After the requisite amount has been withdrawn, the puncture is sealed as usual, and the patient is kept without pillows, and very quiet, for the next day. When serum is given, a quantity of cerebro-spinal fluid should first be withdrawn equal to the amount of serum to be given, then the dose is slowly injected. Afterwards the patient should be kept with the hips supported by pillows, the foot of the bed raised, and the head low, so that the serum will travel up the spinal canal.

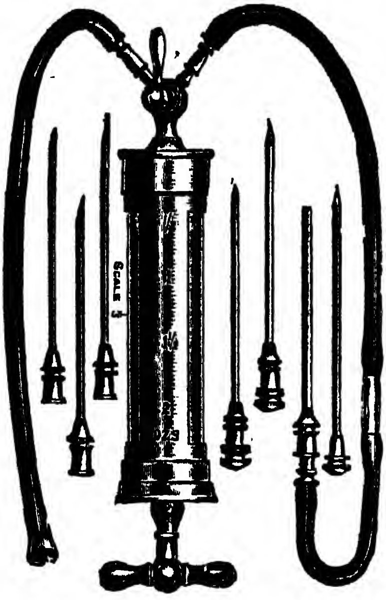


FIG. 204.—DIEULAFOY'S ASPIRATOR.

(By courtesy of the Surgical Manufacturing Co., Ltd., London.)

Aspiration.—Aspiration either by Potain's method or by Dieulafoy's method is done in order to remove fluid from the pleural cavity. The fluid may be withdrawn either by gentle traction on the piston of the special pump provided, or it may be sucked into a special bottle in which there has been created a vacuum. The greatest precautions must be taken to ensure that asepsis is complete; this is where the nurse's responsibility comes in. This method of aspiration is not much in use to-day, and all the other precautions necessary, e.g. adjustment of the various taps and the cork, may be left to the medical officer, who invariably carries out the treatment.

CHAPTER 18

DIET AND SICK-ROOM COOKERY

FOOD AND FOOD-VALUES. PROTEINS. FATS. CARBOHYDRATES. VITAMINS. VITAMIN A. VITAMIN D. VITAMIN E. VITAMIN B. VITAMIN C. TABLE SHOWING HOW THE VARIOUS DISCOVERED VITAMINS ARE DISTRIBUTED IN FOOD. VALUES OF SPECIAL ARTICLES OF FOOD. MILK. BUTTER. CHEESE. EGGS. FISH. MEAT. FOOD DIGESTIBILITY AND CALORIE-VALUE TABLES. VEGETABLES. FRUITS. BEVERAGES. A READY RECKONER BY CALORIES. SICK-DIET. MILK DIET. LIGHT DIET. ORDINARY DIET. PRACTICAL SICK-ROOM COOKERY. BEEF TEA. BROTHS AND SOUPS. CHICKEN TEA. RAW MEAT JUICE. JELLY. JUNKET. PEPTONIZED MILK. GRUEL. ARROWROOT. ALBUMEN WATER. BARLEY WATER. EGG DISHES. IMPERIAL DRINK. LEMON OR ORANGE DRINKS.

THE subject of dietetics is an ever-widening one, and, for mental nurses especially, its importance cannot be over-estimated. Special diets for particular cases are discussed at appropriate points later on in this work, but meanwhile it is advisable that the nurse should generally supplement her knowledge of food-values.

Food and Food-values

In normal health, the quantity of food required each day depends upon the individual. It is true that on an *average* 3,000 calories are found to be ample, but appetites and occupations vary so much that each person must provide himself with an amount of fuel efficient for his own particular need, and that need is determined during the years of his development and according to the trend of his activities, physical or mental. Numerous other considerations must be made; for instance, there may be periods of hot weather during which a very much reduced intake is necessary, or periods of holiday-making at the seaside or in the country, during which the amount of food is greatly increased.

The person who caters for a group of individuals must be prepared to provide a satisfactory amount of protein, carbohydrate, fat, mineral matter, and water for her charges. She must have a knowledge of food-values and an understanding of the

vitamins. She must also take into account the effect of good service of food, a subject discussed in the next chapter.

Proteins.—The meaty, albuminous, nitrogenous, or protein elements of the diet may be chosen from the flesh of the ox, the sheep, the pig, from poultry and game, from fish, from eggs, and from milk. In cooking, there is a certain amount of loss of protein, which is variable according to the method and to the type of flesh, but as a general rule, butcher's meat, after cooking, yields about one-fifth of its original weight as protein. Thus if 4 oz. of average meat are cooked and served on a plate, the

FIG. 205.—AN UP-TO-DATE HOSPITAL KITCHEN.
(By courtesy of Messrs. Benham & Sons, Ltd.)

consumer would have four-fifths of an ounce of protein. Using the accepted convention that 1 oz. equals 30 grammes, and that every gramme of protein provides 4 units of heat commonly called calories, we find that roughly in this case there would be available 24 grms. of protein, or 96 calories.

Peas, beans, nuts, and cereals also provide a certain amount of protein supply in the daily menu, but their quality is not so good as that of the animal proteins.

Fats.—Many of the fats occur in meats, and it is difficult to separate one constituent from the other. Butter is the chief

example of animal fat. Vegetable oils provide a subsidiary amount of fat, which is the great producer of heat in the body. One gramme of fat is equivalent to 9 calories, so that good butter, which contains about 83 per cent. of pure fat, gives us 225 calories for every ounce eaten.

Carbohydrates.—As a general rule, carbohydrates yield about the same number of calories per unit weight as the proteins. In addition to having power-producing properties, they may be converted into fats in the body. A teaspoonful of jam represents about 12 calories.

Vitamins.—Vitamins originate in the vegetable kingdom, although they may be stored, and even manufactured, in certain animal tissues or secretions, e.g. in the liver, and in milk. They are rather unstable; for example, milk loses its vitaminic activity when heated to a temperature of about 158° F.

The vitamins have indeed been proved to be of such outstanding importance and value to the individual that they may now be regarded as the basic factors of every well-balanced diet. Two main divisions have been formed. The first consists of those extracted from various foodstuffs by solvents which are known to dissolve fat; they are thus called the *fat-soluble vitamins* (A, D, and E). The second division contains those extracted by water, and known as the *water-soluble vitamins* (B_1–B_6, and C). Several new types of vitamin have recently been discovered.

Vitamin A.—Vitamin A provides an example of the discovery that not only do the animals store up in their bodies vitamins which are derived from plants and from other animals who have been feeding on strongly vitaminic diets, but they also manufacture vitamins in their own bodies, by means of an elaboration-system based on a certain original supply. Thus *carotene*, the important pigment of many vegetables, is the chief vehicle of vitamin A, the latter being extracted in a very thorough manner by the complex action of the liver. In order to get our supply of vitamin A, we can therefore make sure of a regular supply of either the green or root vegetables containing the *pro-vitamin*, as carotene is called, or of juices and extracts from the glands of animals, or of both. For example, all cooked or uncooked vegetables (see table) give us vitamin A, and if we wish to add a concentrated amount of the vitamin to our diet, we can take quantities of liver extract, especially that of the *halibut*, which has actually been discovered to be far more prolific in vitamin A than cod-liver oil. The liver as sold by the butcher is full of this vitamin also. In summer, when cows feed on green grass, their milk, cream, and butter are productive of a maximum supply. But all animal fats, with the exception of *lard*, contain vitamin A.

It is thus obvious that vitamin A is in plentiful amount in our midst.

We may sum up the activities of vitamin A by saying that it is a *protective*, or *anti-infective*, vitamin.

Vitamin D.—Vitamin D is the source of influence which results in the extraction of vital phosphorus and calcium from the food, and maintains the incorporation of these substances in bone and tooth. For the supply of vitamin D, we have to look beyond the dinner-table. The action of solar radiation on the tissues under the skin has not yet been fully explained, but we do know that there is a substance, *ergosterol*, a pro-vitamin in food which when it is radiated either in the food itself, or in the tissues, by ultra-violet emanations, gives rise to vitamin D. So far failure has been the rule in the attempts to manufacture vitamin D by taking pure ergosterol and submitting it to ultra-violet radiations. Chemists, however, believe that in *calciferol*, a substance derived from irradiated ergosterol, there is present a pure crystalline example of vitamin D. Calcium and phosphorus in ideal supply may be expected, and satisfactory dental growth ensured, by a diet which contains plenty of cow's milk (vitamins A and D, and calcium) and fresh vegetables, and by other sources of vitamin D (sunlight, cod-liver oil, etc.); cereals must be limited. Vitamin D is acknowledged to be the *anti-rachitic* vitamin.

Vitamin E.—So little of this is known as it applies to the human being that nothing definite can be stated about its influence, but in laboratory experiments on male and female rats, sterility, abortion, and sexual degeneration were all found to occur in the absence of this vitamin, which is obtained from wheat-germ oil and the leaves of certain green plants. We may refer to vitamin E as the *anti-sterility* vitamin.

Vitamin B.—This vitamin is sometimes called the *vitamin B complex*. There are half a dozen or more groups, B_1, B_2, B_3, B_4, B_5, and B_6, but for all practical purposes it is still advisable to refer to the two chief groups, viz. *vitamin* B_1 and *vitamin* B_2.

Vitamin B_1 is found in numerous articles of food. One of its sources is yeast, from which the preparation *Marmite* is made; another is the germ of wheat, which provides us with *Bemax*. But all cereals, bran, brown bread, peas, and beans contain vitamin B_1, and it occurs in the yolk of egg and in liver, in milk, fresh fruit, and vegetables.

In addition to causing stimulation of growth, vitamin B_1 acts like an *aperitif*. It increases the appetite and intensifies the absorptive processes. It is the *anti-neuritic* vitamin.

Vitamin B_2.—This vitamin, which is found in yeast, liver, milk, green vegetables, eggs, and certain cereals, is the division

usually referred to as the vitamin B complex, and B_3–B_6 are closely linked up with it. It stimulates growth and development, and keeps the skin healthy; it is thus known as the *anti-dermatitic* vitamin.

Vitamin C.—Fresh fruits and raw vegetables contain large amounts of vitamin C, but it should be remembered that cooking is apt to destroy the vitamin by oxidizing it. The orange and the lemon, regarded till recently as the most prolific sources of vitamin C, have had to give way to the pepper lately discovered of proved high vitamin-content, *paprika*. Tomatoes, watercress, lettuce, cabbage and spinach, the juices of tomatoes and turnips, and the skin of apples contain vitamin C. Milk when boiled not only suffers by spoiling of the lactogen, but vitamin C is almost completely destroyed; pasteurization, however, reduces the vitamin content only very slightly. Vitamin C is called the *anti-scorbutic* vitamin. It promotes the formation of good blood and healthy teeth.

Scurvy is very rare in the United Kingdom, but when it does occur it is generally due to lack of green vegetables, to a limited diet of br-ad and butter, tinned meat, and boiled tea. The juice of an orange every day will keep scurvy away.

TABLE SHOWING HOW THE VARIOUS DISCOVERED VITAMINS ARE DISTRIBUTED IN FOOD

Vitamin A.	*Vitamin B_1.*	*Vitamin B_2.*	*Vitamin C.*	*Vitamin D.*	*Vitamin E.*
Butter	Yeast	Yeast	Paprika	Butter[1]	Wheat-
Cream	Cereal	Liver	Oranges	Milk[1]	germ oil
Milk	germs	Milk	Lemons	Egg yolk	Lettuce
Halibut liver	Egg white	Green	Grape-fruit	Suet	Egg yolk
Cod liver	Liver	vegetables	Tomato	Cod liver	Liver
Ox liver	Peas	Egg white	Uncooked	Irradiated	Fats
Sheep liver	Beans	Fresh fruit	cabbage	foods	
Animal fats	Lentils		watercress		
(except lard)			spinach		
Herring			lettuce		
Egg yolk			Turnip		
Red palm oil			Potatoes		
Fresh veget-			Apples		
ables (root			Milk		
and green)					

[1] Provided the cows are on grass.

Values of Special Articles of Food

The variation of diet seems to be founded on the principles of provision of perfectly balanced supplies of the essential factors, hence the tea, milk, sugar, bread, butter, bacon, egg, and marma-

lade for breakfast; the soup, fish, meat, vegetables, pudding, fruit, coffee, and condiments for dinner, and so on. A mixed family, consisting of children and adults, has representatives of the healthy schoolboy appetite, of the restrained dietary limitations of the youth or maiden who fears obesity, and of the capricious negativity of the withered spinster who does not "agree" with most of the ordinary things of the dinner-table. The housewife has therefore to make provision for individuals and not for masses. Children vary in calorie requirements according to age.

The following are the individual articles of diet in common use.

Milk.—By drinking a tumblerful of milk we provide ourselves with the following amount of calories: protein, $3\frac{1}{2} \times 4 \times 3 = 42$ calories; fat, $3\frac{1}{2} \times 9 \times 3 = 94\frac{1}{2}$ calories; carbohydrate, $4\frac{1}{2} \times 4 \times 3 = 54$ calories; total about 190 calories. Milk is also rich in the vitamins A, B, C, and D. The vitamin content closely depends upon the nature of the cow's food. If she is fed on pasture, the carotene provides a rich supply of vitamin, but in the winter, when turnips and other roots as well as oilcake are given to the cow, the milk is poor in vitamin. Milk which has been boiled not only contains altered lactalbumin (which is difficult to digest when coagulated by boiling) but it loses a great deal of its vitaminic activity.

Butter.—Butter is concentrated milk fat, produced by beating milk lightly in a churn so that the fat globules become amalgamated into a compact mass of solid or semi-solid fat. Since there are over 200 calories in every ounce of butter, its position as an essential food is explained.

Cheese.—Cheese is another derivative of milk containing both protein and fat. In some cases cheese is made entirely from skimmed milk, so that it is chiefly protein in character; in others, cream is added to increase the percentage of fat in the cheese. The latter must be distinguished from *cream cheese*, which is a soft, friable, and loosely bound cheese, eaten in a comparatively fresh state. In an ounce of ordinary cheese there are about 130 calories.

Eggs.—The hen's egg is as important as cow's milk in our dietary. In the raw state, eggs are easily digested by everybody, always excepting people who are sensitive to egg-protein. The best type of egg for the patient is the lightly boiled egg, with the white just "set" and the yolk liquid. The yolk contains 15 per cent. of protein and 33 per cent. of fat, in addition to the valuable iron salts. The white contains about 12 per cent. of protein. A fair-sized egg, weighing about 2 oz., roughly has a calorie value of 75. One of the great advantages of eggs is that they can be served in so many different ways.

Fish.—Generally speaking, fish form a group of foodstuffs suitable for the lighter diets, but it must be remembered that certain fish (e.g. salmon, herring, mackerel, sprat, etc.) are rich in fat, and thus may be difficult to digest. *White fish*, represented in the shops by haddock, whiting, plaice, sole, cod, ling, halibut, turbot, etc., are easily digested, and are admirable, when boiled or steamed, for early convalescence. All smoked, cured, and otherwise preserved fish may be tasty and palatable to the healthy person, but they should never be given to the invalid. Half a pound of cooked white fish contains on an average 45 grms. of protein and 8 grms. of fat, equivalent to about 250 calories.

Meat.—The chief meats are those of the ox, the sheep, the pig, the domestic fowl, other types of poultry, game, rabbits, and venison. The digestibility of meat usually depends upon the state of the muscle tissue used and on the way in which the cooking is done. Boiled chicken, for instance, is an ideal flesh to build up the system for heavier meats, but a well-roasted chicken may be as digestible as a boiled chicken if it is properly cooked.

Butcher's meat varies in strength from the juicy rump steak to the sweetbread or pancreas, or tripe from the stomach. In certain cases, meat has a considerable proportion of fat. This depends upon three factors, viz. the *quality* of the meat, the *type* of animal, and the *region* from which the meat is selected.

Mutton is supposed to be best when the sheep is two and a half years of age; loin chops, and cutlets from the upper part of the thorax, when lightly grilled, are eminently suitable for invalids. It should never be forgotten that veal and lamb may be much fatter than the adult flesh, and therefore heavier.

Pig's flesh is much fatter than that of the ox or the sheep, and is rather indigestible; the breakfast bacon is the standard type of domestic supply of cured pork.

The various entrails of the above animals are useful in the dietary; kidneys, liver, pancreas, heart, brain, etc., all have their value. When meat is roasted or grilled for invalids, it should be very lightly cooked, and red.

To give nourishing and simple proteins, a soup can be made by boiling bones or minced meat, chicken, etc. Such soups are often more stimulating than nourishing, but they serve a certain purpose, and every nurse should appreciate their value. The following tables show the comparative digestibility of foods, and the composition and calorie value of certain meats.

TABLE OF FOODS ARRANGED ACCORDING TO THEIR COMPARATIVE DIGESTIBILITY

(With acknowledgments to Gilman Thomson and James Burnet)

1. *Easily Digested:* Oysters, soft-boiled eggs, sweetbreads, boiled white fish.

2. *Light Diet:* Boiled chicken, lean roast beef, lean steak, scrambled eggs, tripe.

3. *Ordinary Diet:* Roast mutton, fried bacon, roast chicken, liver, roast lamb, mutton cutlets.

4. *Heavy Diet:* Veal, ham, rabbit, salmon, herring, pork.

COMPOSITION AND CALORIE VALUE OF CERTAIN MEATS (AFTER PAVY)

—	*Lean Beef.*	*Fat Beef.*	*Lean Mutton.*	*Fat Mutton.*	*Veal.*	*Bacon.*	*Chicken.*
Protein per cent.	19·3	14·8	18·3	12·4	16·5	9·8	26·5
Fat per cent. .	3·6	29·8	4·9	31·1	15·8	48·9	10·0
Salts per cent. .	5·1	4·4	4·8	3·5	4·7	2·3	3·8
Water per cent.	72·0	51·0	72·0	53·0	63·0	39·0	59·7
Calories per oz.	35	100	36	95	63	145	60

Vegetables.—The vegetable kingdom provides us with several groups of foods. The various parts of the plant supply us with types such as the *cereals* and the *pulses* (the ripening, or ripe, seeds); the *roots* and *tubers*; and *green vegetables* (stalks and leaves). Fruits are dealt with separately. As a general rule, the vegetables are important first and foremost in the supply of vitamins, but they also provide salts, a certain amount of carbohydrate, and, in specific types, vegetable proteins and oils. The waste material of vegetables, a derivative of *cellulose*, is the basic material of the *roughage* so essential to the free passage of the bowel contents, and therefore is a preventive of constipation.

Cereals.—These are foods having origin in dried ripe seeds which by milling are made into meals or powders. They are also called the *farinaceous* foods. The chief members of the group are *flour* from wheat, containing a well-known vegetable protein called *gluten* (100 calories per ounce); *oatmeal*, which contains 65 per cent. of carbohydrate, as well as oils, protein, and iron (120 calories per ounce); *rice*, a cereal full of starch, and a good substitute for potatoes; also *cornflour*, *farola*, *semolina*, *pearl barley*, *maize in various forms*, *macaroni*, *spaghetti*, *vermicelli*, and numerous proprietary forms of crushed seeds, including rye, sold under various trade names.

Pulses include the dried seeds of the pea and bean, also lentils; the fresh seeds also have a certain protein value. Dried peas when cooked provide about 20 per cent. of protein, and lentils have practically the same protein content. In an ounce of peas, beans, or lentils we may expect to be provided with 100–120 calories.

Root Vegetables (Tubers).—In this group are found all the common vegetables of a non-leafy character. Some of the tubers, e.g. *arrowroot*, *sago*, *tapioca*, may be classed with the farinaceous foods,

but the chief representatives of the tubers are the common root-vegetables found on every dinner-table, viz. *potatoes*, *turnips*, *carrots*, *parsnips*, *beetroot*, and *radishes*. Many of the tubers contain very little food-elements, consisting chiefly of cellulose and water, with certain mineral salts.

Green Vegetables.—The common green vegetables are the constituents of salads—*lettuce*, *onion*, *endive*, etc., and those encountered every day in the boiled state and in soups—cauliflower, cabbage, spinach, leeks, vegetable marrow, brussels sprouts, celery, vegetable-tops known popularly as "greens," and if we may admit a red member to a green assemblage, tomatoes. None of the above represents more than 10 calories per ounce.

Margarine.—The basis of margarine is *vegetable fat* softened by adding a certain amount of milk. To make the substitute more like the genuine article, it is customary to add colouring matter and salt, but all who have experienced margarine know that in appearance, taste, and effect there is no comparison between the two types of fat. There is no doubt that when "doctored" by a certain controlled amount of butter fat or fat from a herbivorous animal (not more than 10 per cent. is allowed), there is an increased vitamin supply, and it is now becoming customary to add vitamin to margarine.

Fruits.—Fruits contain water, sugars, and a certain small amount of vitamin. Many fruits act as laxatives, the chief being apples, prunes, figs, pears, and oranges. The vitaminic power of oranges and lemons has already been mentioned. The most nutritious fruit is the banana, which contains a considerable quantity of starch and sugar, and provides about 20 calories per ounce. Plums are also of comparatively high calorie value, often giving as many as 25 calories per ounce. Both of the above fruits also contain protein. Strawberries may cause nettlerash in sensitive persons. Dried fruit, such as currants and raisins, are of high calorie value—about 100 calories per ounce. Fruit can be eaten only in moderation. Cooking often makes fruit more palatable and of greater variety to the patient.

Beverages.—We are here concerned only with the position that should be taken by alcohol in the daily dietary, and while a glass of beer or a weak whisky and soda cannot do any harm at meal-times, drinking at odd periods between meals is not necessary, and is therefore a luxury or a form of recreation when it is kept within limits, but a vice when it leads to mental and physical disabilities. The old and weary may require their daily ration, but the young and vigorous do not need any alcohol at all.

Gin is the basis of most "cocktails"; it is distilled like whisky and flavoured with various herbs. Many of the Continental liquors contain *absinthe*. *Liqueurs* are alcoholic syrups strongly flavoured with peppermint, juniper, caraway, etc., and contain-

ing almost pure alcohol; they are very potent, and are meant to be taken only in minute quantities.

Non-alcoholic Beverages.—Despite the claims of manufacturers, advertisers, and addicts regarding their particular form of beverage, there is nothing to match a glass of clear cold water, fresh from a spring, or if that is not possible, drawn from a supply which is known to be of first-class quality. Soda-water, or potash water, or a glass of any of the numerous medicated waters from British or Continental spas (Apollinaris, Vichy, etc.), are all pleasant and health-giving variants of the normal water supply. Milk mixed with soda-water is used in every sick-room at one time or another. Patients suffering from pneumonia derive great benefit from this mixture, and it is palatable to dyspeptics.

Tea, coffee, and *cocoa* are stimulants. Tea when properly infused is an ideal reviver of a tired body and brain. If the leaves are left too long in the teapot, the tannin is increased in strength, and this factor is at the root of all digestive disturbances having origin in tea-drinking. Space does not permit the complete description of the ideal way of making tea, but it should be considered a prime necessity for all nurses to become expert in its preparation, as patients, capricious at any time, complain bitterly if their tea is not palatable. The active principle of tea is *theine*; this has great stimulant properties of much the same type as *caffeine,* which is the active element in coffee.

Cocoa is advocated on every hoarding as the ideal food, drink, and sleep-inducer. Probably its chief value lies in the large amount of fat it contains; sugar is also an important constituent. Cocoa made with milk and served not too hot is a very fine food and stimulant at lunch-time. *Theobromine* is the active constituent.

A Ready Reckoner by Calories.—In order to make it easy for the nurse to draw up a diet-sheet or arrange meals for the day, the table which follows on p. 261 has been devised to show the value of the common articles of food by calories per ounce. For all practical purposes, 30 grammes are equivalent to 1 oz., and in calculating the calories it has been assumed that 1 gramme of protein or of carbohydrate gives 4 calories, while 1 gramme of fat gives 9 calories.

Sick Diet

A satisfactory dietary is as important to the patient as treatment by drugs or other methods. Ill-health is almost invariably associated with faults in the process of building and repair of the tissues. Loss of appetite may result in reduction of normal supply of materials; loss of function may mean imper-

READY RECKONER FOR DIET, BY CALORIES; UNIT, ONE OUNCE

CALORIES

Over 250.	200–250.	150–200.	125–150.	100–125.	75–100.	50–75.	Less than 50.
Dripping (262)	Butter (225) Margarine (223) Lard (250)	Chocolate (178) Bacon (165)	Cheese (130)	Oatmeal (120) Thick cream (120) Pork (118) Dried peas (114) Sugar (114) Dried beans (112) Dried lentils (110) Ham (104) Macaroni (104) Flour (103) Sago (103) Tapioca (103) Rice (102) Fat beef (101)	Jam (98) Currants (96) Marmalade (96) Raisins (96) Fat mutton (95) Honey (95) White bread (90)	Brown bread (72) Lean meat (65) Salmon (65) Chicken (60) Sardines (59) Herrings (57) Syrup (67)	Half egg (38) Liver (37) Lean mutton (36) Rabbit (35) Green peas (32) Potatoes (30) Plums (23) Milk (20) Bananas (19) Tripe (17) Apples (14) Beetroot (12) Carrots (10) Oranges (10) Greens (8) Turnips (8) Onions (7)

The figures after each article indicate the average number of calories. Most vegetables and fruits not mentioned above have a calorie value of from 5 to 10.

fect or improper use of the quantity of food ingested; in both cases, there is a need for special preparation of the diet, so that it will be able quickly to remedy these defects and sustain the patient while the abnormal condition exists. In convalescence, the essential is a gradually increasing diet, varied and appetizing —something that will tempt the patient to eat more and more. In acute illness, nourishment must be provided in small, easily digested quantities at frequent intervals. In special diseases, the dietary must be carefully planned so as to include only the materials suitable to the disease, and to leave out things well known to be harmful and even dangerous in certain conditions.

In general diseases, therefore, we may have to deal with a temporary simplification of the diet, ranging from complete starvation to an ordinary diet with limitations. As a rule, we speak of milk diet, light diet, and full diet.

Milk Diet.—We already know the value of milk as a food. Cow's milk seems to be our most reliable stand-by in acute disease. No matter how grave the illness, unless there be some special rule to the contrary, milk is indicated, since often the stomach can tolerate milk when other forms of food are rejected. Many doctors can testify to the fact that pneumonia, typhoid fever, acute sepsis, and many other critical diseases have been treated successfully by abundance of good milk. It is not good nursing to put a gaunt mug of rapidly degenerating milk at the patient's bedside, and hope for the best. The milk must be of the best quality, and it must be palatable. The patient must be coaxed to take his nourishment. The milk must be disguised, varied, heated, iced, peptonized if necessary, or otherwise altered. Even if it amounts to the taking of a teaspoonful of milk every hour, such invalid feeding is bound to have good effect.

In the usual " milk " diet, the basic element can be supplemented by egg-flip, in which an egg is beaten up with a small amount of sugar and stirred into a tumbler of warm milk, brandy or sherry being added as available or desired. Jellies, meat juice, and fruit drinks are generally allowable extras.

Light Diet.—The use of the term " light diet " is not universal, nor is it definite, but it is adopted frequently by doctors in practice, and the nurse should understand what is meant by it. We may define it as the transitional diet between the fluids of fever and the solids of complete convalescence, but many light diets have a considerable calorie power, and a certain class of people, ladies especially, manage to exist on rations which according to standards are not of sufficient value to maintain active life.

In a light diet the following may be the main articles: Boiled white fish, haddock, whiting, or sole, junket, milk puddings, strained soups. Breakfast may consist of weak tea with crisp

toast and a good supply of fresh country butter; one egg, lightly boiled or poached, is allowable. Lunch may include half a cup of clear soup, boiled or steamed fish with butter sauce, with a fruit jelly or ice-cream. Tea should consist of weak tea, bread and butter, and some light cake, preferably of the sponge-cake type. At bedtime all that is necessary is a cup of one of the well-known patent foods, or of warm milk, with a dry wheaten biscuit. The advantage of this light diet is that it can be gradually built up into the ordinary diet, described below, by careful addition of chicken soup, boiled chicken, custards, asparagus, spinach, well-minced meat, sweetbreads, etc.

Ordinary Diet.—Once a patient reaches the stage of requiring ordinary diet, he is convalescent, and soon regains his normal state of health. But it must be remembered that in the first few weeks after an illness, it is essential to make up as rapidly as possible for the wastage of the reserves that has been going on, therefore it is sometimes necessary to increase the normal ration for a day or two. To begin with, boiled mutton, the less fatty meats, etc., should be given. Ultimately, the usual carefully balanced diet, consisting of the appropriate quantities of protein, carbohydrate, and fat, is provided, care being taken to avoid, for patients recently ill, such heavy things as pastries, cheese, salted and pickled meats, pork, salmon, and herring.

Practical Sick-room Cookery

Cooking, at all times a fine art, becomes of paramount importance where invalids are concerned, therefore the subject of invalid cooking must be studied thoroughly by nurses if they are to be completely successful with their treatment.

The nurse is referred to the standard text-books of cookery for her basic knowledge of this most estimable branch of domestic science; in this chapter, there will be considered, in a very brief way, only the main methods of cooking and the special principles involved in preparing food for the sick. Three very important changes are brought about when food is subjected to heat, viz. *destruction of germs and parasites or their eggs, increased palatability of the food, and a more digestible condition of the food.*

It is difficult to say how many distinct methods there are of cooking. Most of the old authorities recognized *six*, as follows: boiling, frying, stewing, roasting, grilling, and baking, but nowadays there are many modifications and additions to be considered, and soup-making, steaming, cooking in casserole, and many other types of cookery are part of the daily routine. In preparing food for the sick, any of the above methods may be used, but modifications must be adopted for individual cases. Although the cook and the nurse generally work in separate

spheres, it should not be impossible for the nurse to descend to the kitchen, if necessary, and give her advice, or even to make a special dish herself.

In the following recipes, many of which are capable of alteration one way or another, are stock examples of food for the invalid.

Beef Tea.—Beef tea has been the standard sick-room beverage and so-called " nourishing " medium for many decades. Nevertheless, it must be admitted that beef tea does not act by its nourishing elements, but by its stimulating elements; it is also a great source of mineral salts. Whether its effect is obtained by psychological influences or not, there can be no denying that beef tea succeeds in making the appetite improve. It should be prepared by placing a pound of lean meat in a large jam-jar, containing 1 pint of water. The meat is first cleared of all fat, fascia, gristle, skin, and other surplus matter, and it should be cut into ¼-inch cubes before being placed in the jar. An air-tight cap of oiled or buttered parchment is tied over the top of the jar, which is then placed in a saucepan of boiling water. Allow the cooking to go on for 4 hours, stirring the contents of the jar occasionally. When the beef is completely macerated the contents of the jar should be passed through a fine sieve. The fat is skimmed from the surface, although a little inevitably remains. Salt should be added to taste, and the beef tea is ready to be served hot in a feeding-cup, which should have been warmed previously by boiling water.

Broths and Soups.—These are strong solutions of the juices of beef in water. Mutton or veal may be used. In the former case, the best meat is that obtained from the scrag end of the neck. The recipe consists of 3 lb. of mutton, 1 quart of cold water, 1 onion of moderate size, ½ teaspoonful of salt, and parsley to taste. The meat is chopped up into fine portions and the bones with it. Place the whole in a saucepan, heating slowly; as the temperature increases, a scum rises to the surface, and this should be removed at intervals. Boil for a few minutes, then reduce the flame, and allow the soup to simmer for 4 hours, the lid being kept on during this time. Then strain the whole through a fine sieve, and allow it to cool. When cold it will be possible to remove the solid fat. As required, the broth can be heated up, barley or rice being added, and the broth simmered till the cereal is soft.

Chicken Tea.—A " boiling fowl " is essential. The flesh should be stripped from the bones and cut up into small pieces. The bones should be cut with a chopper. The whole is placed in a saucepan, 6–7 inches deep, the solid matter being covered with water; season with salt, pepper, and herbs. After the lid is put on, the contents of the pot should be raised almost to boiling-

point, then, after a few minutes, left to simmer for 5 hours. Strain, cool, and remove grease. When cold, the chicken tea "sets" like a jelly, owing to the gelatine extracted from the bones. It is a most palatable dish for invalids in this form. If tea is necessary, heat the mixture, which will quickly liquefy. Rice, arrowroot, or an egg may be added as desired.

Raw Meat Juice.—Four ounces of rump steak, free from fat, should be minced as finely as possible. Stir the meat into 1 oz. of cold water; leave covered for an hour, afterwards straining the meat by squeezing it in a muslin bag or one of the special meat strainers in use in hospitals. Meat juice should always be made fresh, as it becomes stale even after a few hours.

Jelly.—Jelly is a semi-solid; the chief constituent is gelatine, derived from the connective tissue of the calf's foot. *Calves'-foot jelly* may be purchased ready for consumption; it contains gelatine and sugar. *Isinglass* is sold in sheets, ready for dissolving; its origin is the sturgeon. *Prepared gelatine*, as sold in packets for domestic use, may be obtained from the hide of the ox.

Jelly is universally popular with all patients, because it is attractive to the eye, easily eaten, and of agreeable flavour. Fresh calves'-foot jelly may be made by stewing two chopped and prepared calves' feet in 2 quarts of water until half the water has evaporated. A jelly, covered with solid fat, is formed when the mixture cools. The fat is removed, and the clear jelly may now be flavoured by adding 5 oz. of sherry, as well as the whites of 4 eggs, with the shells. The whole is then boiled for 10 minutes, being well stirred when hot. It should be strained into a mould through flannel, which holds back all the solid particles, and turned out when cold.

Egg jelly is a special form of jelly made by heating in a pan the following ingredients: 1 egg, well beaten up, ½ pint fruit juice unsweetened, 1 tablespoonful of sherry, sugar as required, ¼ oz. leaf gelatine. When the whole forms a clear fluid, pour into a mould and leave till set.

Milk Jelly.—This is also an attractive way of giving milk. Into a pan the following ingredients are put: ½ pint milk, ¼ oz. leaf gelatine, a few drops of vanilla essence, salt and sugar as required. Pour into a mould and allow to set.

Junket.—There are two simple ways of making junket. The first is that of warming carefully a pint of fresh milk to a temperature of 100° F., adding a little fine sugar, and pouring out the milk into a glass dish; a dessertspoonful of rennet is then quickly stirred in, and the whole left in a warm place for an hour. It is advisable to sprinkle some cinnamon over the surface of the mass when set, and the junket is improved by the addition of cream (the popular "curds and cream"). The second

method is almost the same as above, except that a solid junket-tablet is used, this being dissolved in an ounce of water, and added to the warm milk instead of rennet. Vanilla essence or ratafia may be used as a flavouring agent.

Peptonized Milk.—A pint of fresh milk is diluted with 5 oz. of water, preferably boiling. The mixture is heated to 105° F., after which the following may be added according to orders: 2 teaspoonfuls of *liquor pancreaticus*, with 20 grs. of sodium bicarbonate, *or* 1 tube zymine, *or* 5 grs. Armour's pancreatic extract with 20 grs. of sodium bicarbonate. Allow the whole to stand for 15 minutes at 105° F. The milk can then be brought quickly to the boil, or immediately put on ice, in both cases to prevent further digestive action.

Gruel.—Two heaped tablespoonfuls of fine oatmeal are carefully dredged through the fingers into a pint of boiling water, the mixture being well stirred during the process. Add a pinch of salt, then put on a brisk flame, and allow to boil for 3 minutes. Put the lid on the pan, and simmer the gruel for an hour, stirring occasionally. Pass the solution through a strainer, and add hot milk until the fluid is thin enough to make a satisfactory drink. Sugar is added if the patient wishes it.

Arrowroot.—A dessertspoonful of arrowroot powder is made into a thin paste with a tablespoonful of milk. Dilute this with ¼–½ pint of boiling milk. Put the whole on to boil slowly for 5 minutes, stirring all the time. Add brandy, sherry, or lemon essence as necessary.

Albumen Water.—The white of a new-laid egg having been separated from the yolk, it is put in a small bowl, and gently beaten up until there is an even fluid, but not a mass of froth. Add 5 oz. of cold water, and keep up the beating. Strain through fine muslin, and then add fine sugar, vanilla, lemon, fresh lemon juice, or orange juice. For children, only sugar should be added, and the dilution should be twice as much as above.

Barley Water.—Into a saucepan are put 1½ pints of cold water. To this are added 2 oz. of carefully washed pearl barley, and the whole is slowly brought to the boil, allowed to simmer for half an hour, and then strained. If used as a beverage, it should be cooled, and served with a slice of lemon and sweetened to taste. Unsweetened barley water may be used for diluting milk. Rice or oatmeal can be used in much the same way.

Custard.—Custard may be boiled or baked. The initial mixture is made by beating up an egg with a dessertspoonful of castor sugar, adding a pinch of salt, and flavouring essence (lemon or vanilla). When the beating is thoroughly done, the mixture is carefully stirred into ½ pint of milk, and then strained. If boiled custard is required, the whole is put into the inner

container of a double saucepan, and gradually heated until it becomes thick (usually 20 minutes is enough). For baked custard, put the mixture in a pudding-dish, and cook in a moderate oven for 15–20 minutes, when the custard will be properly set.

Poached Egg.—There are various ways of poaching eggs, but the main thing to avoid is over-cooking of the albumen, which thus becomes indigestible. The smallest size saucepan is used, in which water is boiled, then a pinch of salt is added, and the egg, previously broken into a cup, is carefully transferred to the boiling water and allowed to set, the white being kept compact over the yolk as cooking goes on. In some cases, the cup is used as an inner chamber, and a little boiling water used as a heating medium; the water in the saucepan is boiled vigorously. When the egg is set, the cup is removed, the egg turned out on to buttered toast, and served with parsley.

Scrambled Egg.—A very efficient nourishing milk-and-egg mixture can be made by beating up an egg thoroughly until it is an even frothy mass, then add salt and pepper, and stir in half a cupful of milk. The quantity of milk can be varied according to taste, but the more milk there is, the bulkier and more curdy the final product. Meanwhile a flat frying-pan or small saucepan has been on the fire, prepared by adding a piece of butter about the size of a walnut. When the butter is all melted and sufficiently hot, the mixture is poured in, and allowed to stay undisturbed until bubbling starts. With a large spatula, the contents are quickly worked towards one edge in layers, until a solid mound is formed. Serve at once on toast.

Imperial Drink.—This is an old favourite, very useful in many cases when the kidneys require to be flushed out. The following ingredients are necessary: potassium tartrate, 1 oz.; tartaric acid, 1 oz.; white sugar, 16 oz.; oil of lemon, 12 drops; 1 gallon of boiling water. Dissolve these first elements in the last, and stir well. Cool and strain. When cold, Imperial Drink may be served with equal parts of cold water or soda-water. A modification may be made by using cream of tartar instead of the first two ingredients.

Lemon or Orange Drinks.—Lemonade or orangeade can be made by squeezing the juice with an ordinary squeezer, adding sugar as required, and serving with two parts of soda-water or cold water. In greater bulk, lemonade may be made by peeling 3 lemons, taking the rind off only, and leaving all the white. Then cut off all the white, slicing up the pulp into small pieces. These, with the rind, are put into a large, stoutly made jug, and ½ lb. sugar added. A quart of boiling water is then poured over the mass, which is well stirred. The jug is covered, and left standing for an hour. At the end of this period, stir again, and strain through fine muslin into a glass water-jug.

CHAPTER 19

PREPARING AND SERVING MEALS

PREPARING MEALS. FOOD PORTIONS: QUANTITY AND TYPE. SETTING OF TRAYS AND ARRANGEMENT OF FOOD. THE DISTRIBUTION OF FOOD. FEEDING HELPLESS PATIENTS.

A sick person is in such a depressed state of health that his machinery is entirely out of gear, and he may have reached the stage at which his whole being revolts at the idea of any stoking of his fire. To a certain extent, loss of appetite is salutary, as it removes all congestion of the cells, and ensures the disposal of the waste products. There is a strong mental element in all disease, however, and the influence of the will has much to do with the recovery of the patient, so that all those in attendance on the sick should endeavour to stimulate the patient's mind towards his belief in quick recuperation. As soon as the acute stages of a disease have passed off, therefore, it is a vital point to aim at the institution of a condition of *willingness* on the part of the patient to take nourishment.

It is not to be expected that a sick person, labouring under the disadvantages of a tired body or of an incompetent system, should be able to take or to digest the average amount of protein, carbohydrate, and fat required by the normal healthy individual. Nevertheless, according to the conditions of each case, the maximum amount of these essential elements should be ingested, and a capable nurse who understands the situation will see to it that her patients are each made the subject of a special dietetic study, for indeed each one provides an individual problem, and much of the success of the treatment depends not upon the medicines given but on the adjustment of the constituents of the diet to the patient's powers of assimilating to the full their very necessary reinforcing material.

Preparing Meals

The mental nurse may not be responsible for the cooking of her patient's meals, but at any rate, she will be concerned with the way in which to prepare the meals when they arrive from the kitchen, and with the method of serving them in the most attractive manner.

Food Portions: Quantity and Type.—All nurses become acquainted with the method of feeding in a ward during their first week of training. The distribution of meals is one in which almost the entire staff participates, and the direction is usually in charge of the sister or staff-nurse.

The food arrives from the central kitchen on a special wagon. The wants of the various patients are all well known beforehand. Apart from those who are on special diet of fluids or of other carefully selected things, there are usually certain patients who

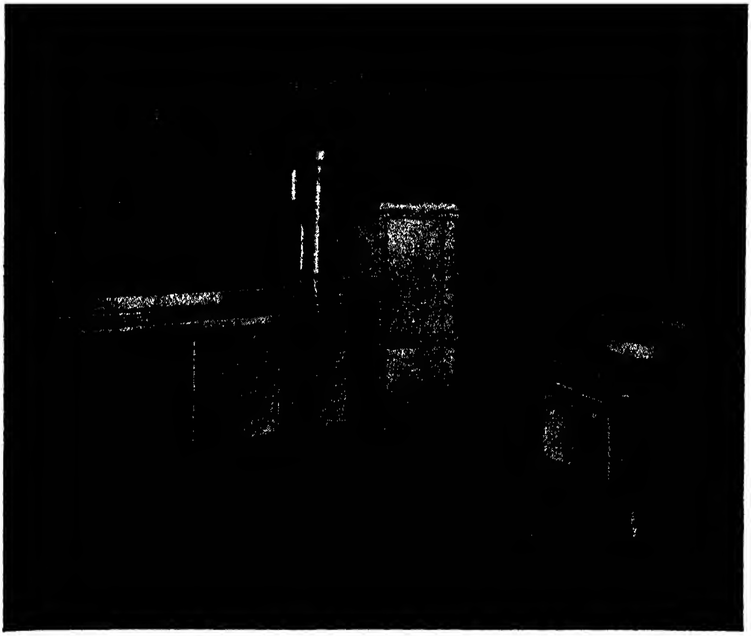


FIG. 206.—AN ALL-ELECTRIC KITCHEN.
(By courtesy of the British Electrical Development Association, Inc., London.)

have fish and milk pudding, while others are, perhaps, convalescent and require meat and potatoes. It cannot be too strongly emphasized that it is a great mental tonic for the patient to have the right kind of food—something which is good for him and something which he eats with relish and not as a duty. When food is badly cooked, lukewarm, and coarsely served, it leads the patient to the habit of "grousing," and every dietetic expert will agree that one of the first essentials to proper digestion is a light heart and a mind free from care, causing the patient to be ready to enjoy to the full the food that is provided.

Thus, if patient " A " can eat more mince and less potatoes, his peculiarities should be catered for, while if patient " B " enjoys potatoes and butter rather than potatoes and meat, there is no reason why he should not be fed in this way, so long as the doctor approves. Again, patient " C " may be capricious, frightened to eat, and may require to be coaxed into taking even a tablespoonful of food.

At the other end of the scale, patient " D " may feel the reaction of well-being so strongly developed that he must not be allowed to suffer from gastric distension. The sign of a successful dietary is a quiet, comfortable, slightly somnolent, and in all respects completely satisfied ward at 2 p.m.

The special problems of feeding as associated with mental disease are discussed in Section III.

Setting of Trays and Arrangement of Food.—Assuming that the food which has arrived from the kitchen conforms to the standards of first-class cooking, heat, and palatability, it is the nurse's duty to make sure that none of its good qualities are lost in the service. The trays should be attractively laid out with knives, forks, and spoons, clean and shining. The glass for the water should be polished carefully, and should be little more than half-full of water, so that there is no possibility of a small pool on the patient's tray which is transferred to the bed-clothes when he takes the first drink. The condiments should be provided for those who want them. Bread should be neatly cut and should not be hard as the result of being left in the open air for several hours. It is quite an easy matter for a nurse to enlist the services of one or two convalescent patients as waiters, and then she can concentrate on the serving of the food on the *hot* plates. Food should not be " dished " out. It should be neatly and carefully arranged, with considerable art, on the centre of the plate, so that the patient will feel he *wants* to eat it, and will develop a further appetite for it.

The Distribution of Food.—If possible, all meals should be distributed at one time. It is irksome to patients to have to sit and watch their neighbours eat. The nurse must remember that a watchful eye must be kept on those who are apathetic over their food, but at the same time, sensitive patients do not like to feel that they are being observed like animals in the zoological gardens at feeding time.

In a surgical ward, where patients have to adopt all sorts of unusual attitudes, it may be necessary for the nurse to assist at the feeding, this being fully described below; but there are many cases of patients who are not helpless but who require certain adjustments made, e.g. the provision of a bed-table, or a pillow, or some other extra support. A meal may be ruined by the fact that the patient has to strain his muscles in order to support

an unsteady tray, which may indeed upset his food over the bed and ruin his repast.

As soon as the patient has finished his meal, the tray should be removed and crumbs carefully brushed from the bed, especially those which may have found their way to the draw-sheet. Milk, bread, or other types of food must never be left at the patient's

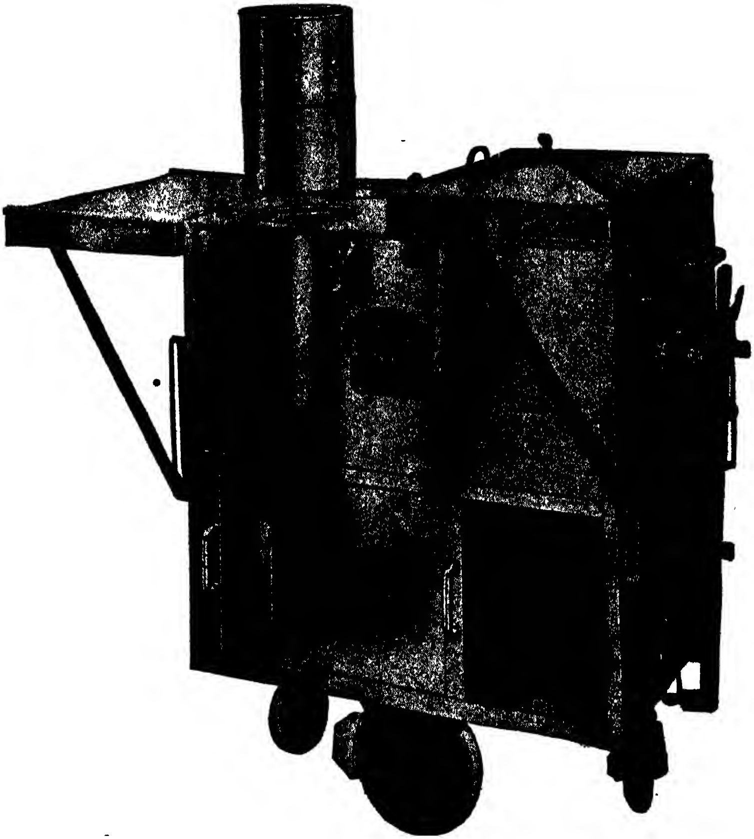


FIG. 207.—ELECTRICAL FOOD TROLLEY.
(By courtesy of Messrs. Benham & Sons, Ltd., London.)

bedside, unless specially ordered. If a patient is not taking his usual amount of food or is otherwise abnormal with his diet, the matter should be reported to the sister.

Feeding Helpless Patients.—People who are very ill require to be fed at frequent intervals with small quantities of nourishment, generally of a liquid nature. This is a different matter

entirely from the problem of those who may take their food at the normal times, but yet may be in such a position, owing to accident or to paralysis, that they are not able to feed themselves. Such disabled people, therefore, must be helped by the nurse, and careful spoon-feeding is indicated, during which the nurse should see that small quantities are given at a time, and that the patients have long enough period between each spoonful to allow them to masticate the food and swallow it carefully. It may be necessary to provide two very small portions of the same course and leave one on the hot plate in order that the whole meal may be given hot.

The best method of feeding a helpless patient is as follows:

The nurse should stand at the right side of the bed, and should make sure first of all that the head of the patient is well propped up by pillows. There should be no constriction about the head and neck. A napkin should be tied under the patient's chin, after which the nurse should support the head on her left hand and offer the food in small spoonfuls, without fuss or hurry. For children, a teaspoonful at a time is sufficient, but an adult may require a dessertspoon. If beef tea is given, it should be supplied in a feeding-cup which is half-full. The contents must not be too hot; otherwise the patient will scald his mouth and tongue. After the nourishment has been given, the mouth should be washed out.

CHAPTER 20

DUTIES CONCERNING DEATH

SIGNS OF APPROACHING DEATH. DUTIES OF THE NURSE. SIGN OF DEATH. LAST OFFICES. LAYING-OUT THE BODY. AFTER-TREATMENT OF THE ROOM.

DEATH may be sudden, in which case the premonitory signs may not be demonstrated, but in the majority of cases death gives its warnings for at least a day before life becomes extinct. In both cases, the nurse should be very conservative and restrained about announcing the fact to relatives. It is always better, if there should be the slightest doubt, to wait until a professional opinion has been passed. Especially is this matter important when a patient is unconscious for some days, and gradually "sleeps away," as the expression goes.

For her own satisfaction, however, it is advisable that the nurse should be able to recognize the signs of approaching death, because she is enabled to make certain plans for meeting the occurrence when it does take place. And in certain suitable circumstances, it may be necessary to inform relatives and friends of the possibility.

Signs of Approaching Death.—As a general rule, the signs of approaching death supervene on a gradually weakening condition, and while the doctor on his daily visits may make the observation that the patient "is going downhill," the situation may be such that death is not imminent. When the patient becomes so ill that his life is only a matter of an hour or so, the moribund signs are definite, and it is then that the nurse must summon the doctor if he is available, since most relatives like to have the doctor at the bedside during the last minutes. Frequently it is impossible for the doctor to attend, but the nurse should always be ready to assist in sending out the summons. When is she to do this? Most probably when she notices that the mucus is caught in the throat, and causes the well-known "death-rattle"; when she sees the distinct faint grey and purple mottling of the cheeks, forehead, and nose; when she recognizes the presence of Cheyne-Stokes breathing; and when the limbs become cold. In most cases of restless patients, the forehead is covered with beads of clammy perspiration.

Duties of the Nurse.—After sending for the doctor, the nurse should do all she can to alleviate the condition. Sponging the face with iced water, and keeping the lips, eyes, and nostrils clean by occasional swabbing with gauze soaked in warm boracic acid solution, always prevent any appearance of distress in death, and such gestures are invariably appreciated by the relatives. If there is plenty of time, a clergyman may be sent for, but much ceremony at the bedside should be discouraged; the truth is that many moribund patients do not have a chance to die in peace. They may be upset by fussing or hysterical friends, and if they are in any pain, the latter cannot be soothed by the whispered conversations in the vicinity of the bed. In many cases, the nurse may have to insist on sending away all but one of the relatives, and her duty should be clear if she has consulted the doctor about it.

Reverting to the actual occurrence of death itself, it is most disconcerting to relatives, however lingering the patient may have been, to be told that the looked-for death has occurred, and then to find that there is still a flicker of life. No matter how advanced a disease may be, lay persons always cling to hope of recovery, therefore nurses who value their reputation will refrain from all final announcements until death is certain or until the doctor has confirmed the suspicions. But since, as mentioned above, the doctor may not be able to call at once, all nurses should know the signs of death.

Signs of Death.—The breathing stops. The pulse ceases. The jaw drops. The eyelids are half-closed. The pupils are dilated. The skin is cold and clammy. Stiffness (*rigor mortis*) sets in.

The old-fashioned method of putting à mirror to the mouth and proving that there is no moisture on it is still in use in private practice as a definite sign of death. It must be remembered, however, that all people do not die in bed, and there are specific cases in which even cessation of breathing does not mean death. For example, drowning accidents may produce apparent lifelessness, but it is well known that artificial respiration must be continued for hours after the victim is found, and many cases of miraculous recovery have been reported as a result of this treatment.

Last Offices

Immediately after death, it is advisable to let all professional considerations take second place, and to allow the relatives a few minutes in reverent silence at the bedside. A few apt words from the nurse never go amiss, and this is one of the occasions when the personality of the nurse should be strongly demonstrated.

After the relatives have gone, the nurse should communicate with the doctor and obtain permission to lay out the body. A note should be made of the exact hour of death.

Laying-out the Body.—The dressing of the body is more important than the daily toilet of the living patient. Two nurses should do the work, and they should carry it out expeditiously, with all reverence and with silent respect for the dead. The eyelids should be closed with small pledgets of wet cotton-wool; the lower jaw should be fixed to the head by passing a four-tail bandage or two turns of a domette round the lower jaw and over the vertex ; the ankles should be tied together ; the whole body should be straightened out. All this is necessary in view of the early occurrence of *rigor mortis*.

Before the toilet of the body is proceeded with, all rings, jewellery, ornaments, and personal belongings of the patient should be collected, an inventory made, and, so far as hospital work is concerned, the whole passed into the hands of the steward, who will deal with the relatives; this relieves the nurse of all responsibility. In private work, the responsible relatives should be given the articles, preferably in the presence of a witness.

All the upper bed-clothes, with the exception of the sheet, are removed and laid aside for transfer to the disinfecting department. The whole body is washed with soap and water. The nails are trimmed, and the hair is combed and brushed. Any wounds are treated with new dressings. The anus and vagina are packed with splint-wool or tow. A special white nightgown is put on the corpse. Stockings may be added, in which case the binding is made on the outside of them at the ankles and knees. The bandage round the jaw can be removed once *rigor mortis* is complete, and the cotton-wool may be taken from the eyelids, which are closed. The bottom sheet is taken off the bed, a clean one takes its place, and one pillow is provided for the head. The body is covered completely, including the head, by a fresh top sheet. Occasionally a folded towel is placed underneath the shoulders, the hips, and the knees, so that removal by the undertakers will be facilitated. It is advisable either to cross the hands in front of the chest or to allow the arms to lie straight and very close to the side. Mortuary sheets, of special size, are usually provided in large hospitals, and in these the corpse is rolled, and with the name, age, ward, and time of death written clearly on a piece of paper fixed securely to the sheet.

After-treatment of the Room.—In a hospital, the cleansing of the bed can be proceeded with immediately the patient is removed to the mortuary, but in a private house the nurse is frequently asked to remain till the funeral is over, and thus is able to dismantle the room. The latter should be subjected to a thorough " spring cleaning," all carpets, curtains, and furniture

being disinfected. The bed should be stripped and carefully sterilized. The mattress and bed-clothing should be sent away to be steam disinfected. The room should be left to air for a day or two. The relatives usually undertake the reorganization of the room, which, after a death, is often painted and completely altered in character and appearance.

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